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MODERN PRESSWORK

By FRED W. GAGE

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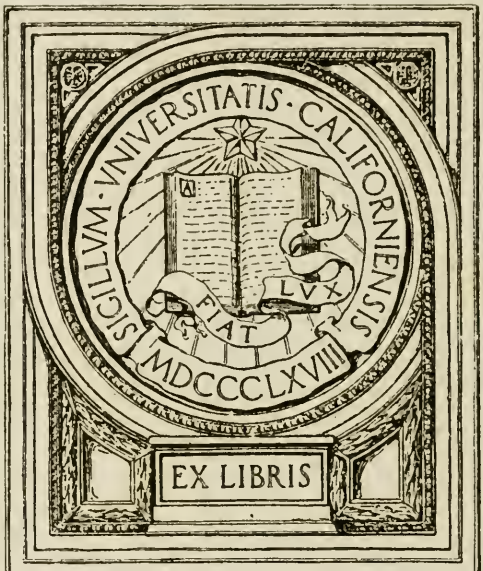

Modern Presswork

BY FRED W. GAGE

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PREFACE.

IN presenting to the craft a work of this nature, which must of necessity be practical if at all useful, it has been the author's aim to arrange in a logical manner such suggestions as might form a working manual on the subject.

It is his especial desire that the younger generation of pressmen may find this book a genuine aid in their efforts toward perfecting themselves in their chosen vocation, and with this in view attention has been paid to matter perhaps generally so well understood as seeming to need little explanation.

As these articles (which have appeared from month to month in *The Inland Printer*) were fruit of the scant leisure of a busy, work-a-day life, the author craves the kind indulgence of the reader for such sins of omission or commission as may be evident. The subject is a large one, and the progress of the printing industry will continue to bring forward new problems, to the solution of which it is hoped the study of this manual may lend added zest.

If, as a whole, this work may be found helpful and instructive, the author will feel amply repaid, albeit fully conscious that many points worthy of careful elucidation may have had scant attention.

FRED W. GAGE.

BATTLE CREEK, MICHIGAN, January, 1909.

Modern Presswork.

CHAPTER I.

INTRODUCTORY.

IN taking up the subject of presswork, with a view to the compilation of a work which may serve as a manual for the beginner as well as helpful to the more advanced pressman, the writer is particularly impressed by the fact that, through changed conditions, works on this subject which were fully up to date a few years ago have now become almost obsolete. And this not so much because of any change in the principles of presswork, but through the introduction of new machines and methods.

For modern industrial progress has been almost revolutionary in many lines, the printing trades being affected in perhaps as great a degree as any, and the methods of handling work, the machines and the results of the pressroom of ten or fifteen years ago would hardly pass muster to-day.

And with these new methods have come also those other products of industrial reorganization — the specialty shops, their specialty machines and workmen. So that it has become a common complaint that with the passing of the old ways has come a real scarcity of the all-around workman.

In no department of the printing business is this more marked than in the pressroom, and nowhere are

the lines drawn more closely between the different specialties.

Forty years ago the pressman was expected to print on the styles of machines then in use — from hand press to drum cylinder — anything, from a visiting card to a three-sheet poster, and to his credit be it said, there are many examples of his work still extant which bear witness to his skill as a workman. As an instance, the writer has in his collection a half-sheet display card in three colors, which was printed on a "Country Campbell" cylinder, some forty years ago, and is a model of tasteful, enduring printing. The colors are well laid on and the impression sharp and clean, despite the use of a highly glazed stock which would puzzle many a pressman of to-day. And the pressman who handled this also printed the daily issue of his paper and ran off multitudinous "jobs" in between whiles — all on the same press.

To-day we find presswork so divided into specialties that many a pressman, although highly skilled in his own department, would be utterly at a loss to properly handle the placard above referred to. The rapid increase in large rotary machines, not only as newspaper printers, but their invasion of the field of book and magazine printing as well, has called for an army of pressmen in this department alone, and close behind comes the impressive array of smaller rotaries and platens in roll and sheet fed styles, and the more or less complicated and built-to-order machines which turn out specialties of various kinds.

The poster printers are of necessity in a class by themselves, and, not satisfied with all that ingenious

papermakers can offer in printing surfaces, we are now given tin, celluloid, aluminum, cloth, lumber, etc., to print on and many of these in such forms and shapes as to require special machines and men of special training to handle them at all.

Our trade cousins, the lithographers, are equally disturbed by new methods and appliances, the introduction of aluminum and of rotary presses being truly revolutionary in lithography. Yet, whether welcome or not, all these advances are indicative of true progress, and however we may deplore the passing of the old order of things, no thinking person would seriously advocate going back to the former régime, and we must continue to exemplify that distinguishing characteristic of the human race — adaptability — in meeting these changing conditions intelligently.

But because of this increasing tendency toward specialization, it seems more and more difficult to compile a manual on presswork which shall cover the subject satisfactorily; and only the writer's wish to add something to the literature of this subject which shall be helpful to his fellow pressmen in general has induced him to accede to the editor's wish for such an effort.

Manifestly it were useless to attempt to cover the vast field of specialty printing in all its various ramifications, particularly as the ingenuity of scores of inventors is constantly devising new methods of handling, and improved and refined mechanisms which require those in charge to become expert mechanics as well as pressmen. Yet it may be that in some of the articles to follow, the operators of these special machines may find general suggestions which may be

of help to them, even though their individual problems must have individual solution.

Equally certain is it that, despite the increase in specialty work, there will always be grades of presswork in large quantities requiring what we may term "general workmen," and that these different grades must often be handled by one man and on one machine. Indeed some of the finest printing done to-day emanates from establishments which also turn out "hurry up" orders which, of necessity, can be allowed but a minimum of time and pains in every department.

It will therefore be in order to take up the subject of "Presswork" with the distinct idea of touching on the points and making such suggestions as will particularly appeal to the pressman in the ordinary job, catalogue and book printing house, with the hope that those handling the special lines of work mentioned may also derive some benefit therefrom.

At the very outset, however, the writer makes disclaimer of any desire to be classed as an "expert" or to have any one accept his ideas or opinions as the final word on any subject introduced. A working experience of some twenty years has convinced him that there are many practical ways of securing certain results in the pressroom, and often methods radically differing are found of equal effectiveness.

This very situation gives opportunity for occasional interesting and ofttimes heated discussions in our trade publications, wherein able writers labor to convince one another that only their own particular brand of presswork gospel will bring salvation, the interested onlooker usually deciding that one has as good an

argument as the other. So any statement which may follow must not be taken as final on the subject, but rather as the result of a comparatively brief period of human activity and experience; and should your own observations differ or your own methods of work seem preferable, think over the matter carefully, and if you have good reason for preferring your own way, stick to it.

What seems the most desirable of all things is that the workman use his brains in his work, and bring to bear his reasoning powers as a directing force. For by so doing he will not only produce more satisfactory work, but will also develop his own mentality to his certain benefit and advancement. At no time has the demand been more insistent than now for capable, thoughtful workmen. Every employer feels this need and particularly when he must select a foreman or superintendent. The extraordinary growth of our country and its industries may account for this in part, but certain it is that the prospect of satisfactory and rapid advancement was never more definitely within the grasp of the willing and ambitious workman than now. And it seems equally certain that no possible degree of general prosperity can affect the status of the workman who does only enough to "hold his job," handles his work imitatively, "knocks" his more successful brother workman and watches the clock assiduously about quitting time. Such a one will be found detailing his "hard luck" in that the "foreman had it in for him" or some similar tale of woe as an excuse for not holding his job.

But to return to our subject, there will be taken

up in succeeding chapters, in about the order named, such general topics as "Adjustment and Care of the Press," "Tympans," "Make-ready," "Underlays and Overlays," "Adjustment and Care of Rollers," "Guides and Grippers," "Color and Register Work," "Inks and Papers," etc. It is hoped to bring out such details in connection with the foregoing and other kindred topics that may be considered as will prove of distinct benefit to the craft in general. For, while presswork has become a distinct branch of the art, it must forever be the means of proclamation of the compositor's ability, as well as that of the engraver and electrotyper. Indeed all the other branches are dependent on careful presswork for the full exposition of their efforts, and there seems to be little excuse for the petty jealousies and bickerings too often existing between those various departments. Nowhere else can cordial coöperation be more certain of practical and profitable results, and the writer earnestly hopes that the day may soon dawn when the present enmity between the organizations representing these departments may cease, and the hatchet be forever buried.

CHAPTER II.

PUTTING THE PRESS IN CONDITION.

IN commencing the practical study of presswork, we must either assume that the machine we contemplate using is in perfect condition, or else assure ourselves as to that point by carefully and thoroughly examining all the working parts of the machine and their adjustments.

As there is always the probability that, through wear, settling of foundations, etc., a press may be out of adjustment (even though in constant and regular use), perhaps the safer plan would be to proceed on the assumption that our machine is in need of a thorough inspection before going farther.

To the pressman who goes into an establishment previously unknown, and is expected to at once commence or carry on the production of first-class presswork, there comes at once the thought, "What is the condition of the presses — are they kept up to a good standard, or is it the policy of the 'house' to spend as little time or money on repairs as will suffice to keep things moving?" And on the answer to this question will in many instances depend the success or failure of the pressman's efforts.

For unquestionably the workman who has had his training and spent the most of his time in a pressroom where the machines have been kept in good order, will be put to his wits' end to produce nice work if placed

in a room where the machines are in bad condition. He will be confronted with difficulties which he had not before dreamed of, and will find his resources taxed to the utmost. Yet it must be said to the credit of many men that they are doing this very thing day after day.

As to the correctness of the managerial policy which thus allows high-priced men to waste a portion of their time, and expensive machinery to suffer through lack of timely attention, there can be but one verdict — "penny wise and pound foolish." Doubtless the ceaseless rush of work which modern competitive conditions make imperative is largely responsible for this situation in many pressrooms, but it is the writer's belief that in the long run a greater degree of efficiency will be attained by a systematic overhauling of the machines at regular intervals and a timely renewal of all worn parts.

As a matter of fact, the average cylinder press, running under normal conditions and with the usual degree of care, will be distinctly benefited by being taken down after a few years' use and reërected. In no other way can the movements be given so thorough an examination, the accumulated dirt and oily gum removed and the various working parts carefully adjusted to each other. Such a thorough inspection as this not infrequently reveals hitherto unsuspected breaks or defects which might later cause costly smash-ups and delays.

Such an opportunity as this is not often presented, however, so that we must as a rule be content with such an examination as can be made without taking

the machine apart, although, if time and the management will allow, even taking out the bed and cylinder will greatly increase the effectiveness of our efforts.

THE FOUNDATION.

Were all presses built on the same or generally similar plans, it would greatly simplify the work of an instructor in their handling, but in one respect they are all alike in that they must set level and firm. Of course, the masonry or cement concrete foundation is by far the best of all, but the necessities of the business will often compel putting machines on far less stable bases. And as all subsequent adjustments may be rendered valueless by the settling of the frame of the press, the utmost pains should be taken in insuring the stability of the foundation.

In buildings where steel construction prevails, a fairly rigid floor may be found, but with timber work alone a great degree of "spring" is often noticeable. Sometimes this is so great as to jar the whole press at every reversal of the bed, necessitating a slower speed of operation, with a consequent decrease in profits, as well as shortening the life of the press.

In such cases various remedies may be resorted to. If it is possible to shore up the floor joists with heavy timber work below, let this be done, and by driving wedges up tightly most of the "spring" of the floor can be taken out.

In some instances it is possible to introduce into frame construction a single heavy steel I beam under each side frame, which of course gives a far greater degree of rigidity than any timber work. Indeed, the

writer remembers one establishment where the presses were one by one "jacked up" bodily from the floor, steel beams placed in position under the side frames, and a new section of flooring put in under each machine.

In another instance, where shoring up from below was not possible, tie bolts running through the frame of the press down to the ceiling below were there drawn up tightly against a short timber running transversely to the floor joists and a little longer than the width of the press. This seemed to render the whole floor a solid unit, and greatly reduced the springiness.

Insurance requirements nowadays demand a sheet of zinc under all machines resting on wooden floors, but presses erected many years ago are often found on the bare wood. Such resetting of the press as above described will give a chance to put in this floor protection, which by the way is better made of galvanized sheet steel. This latter is more durable and easier cleaned.

LEVELING UP.

In any event the leveling up of the press should be the first matter given attention after the foundation has been looked to, for, even though the machine stood fairly level previously, it may be found sadly "out" after these operations.

A bunch of shingles can usually be easily procured and their use as wedges under the side frames will be found very effective. If the press is greatly out of level, thicker blocking may also be needed. As a rule, however, placing one shingle inside the frame with

the thin edge toward the outside, and driving another on top of it from the outside, will give an even bearing, and if these be placed about one foot apart for the entire length of the side frame a practically perfect result may be assured.

Among his other essentials the pressman should possess an iron spirit-level of known accuracy, and not only use it in bringing his machine up as outlined above, but also in testing the level of the press from time to time. In cases where a settling of the foundation is suspected, do not cut off the projecting ends of the shingles for a few days, or until certain that no further movement may be feared.

In using the spirit-level, pains must be taken to select those portions of the machine which are known to be smooth and even. If you are testing by the bed (which is not usually advisable) run it back and forth and try it in all positions, while if the bed be out of the press, try the tracks or ways throughout their length, and be careful in getting the exact position of the spirit-level on cross-girts or driving shafts.

Having assured ourselves that the press sits level, see that all bolts which hold the side frames to the various cross-girts are brought up absolutely tight, giving the wrench a final sharp blow with a hammer to insure this. The next point to be certain of is the correct adjustment of the

BED MOVEMENT.

This is perhaps the most vital mechanism of the whole press, and as there are many different and meritorious devices on the various makes of presses

which are to be found in modern pressrooms, only general directions can here be given.

Indeed it would seem that the ingenuity of press inventors had been particularly exercised in this direction, there even being in use to-day on one of the best-known two-revolution machines on the market several styles of bed motion which have been tried at various periods in its history.

As nearly all standard flat-bed presses for the finer classes of printing are to-day being built in the two-revolution style, it has seemed expedient to assume that the press under consideration is of this type. It will be noted, however, that practically all the succeeding observations may be equally valuable in the care and adjustment of drum-cylinder machines, and many of them on stop-cylinder, two-color, or rotary machines, etc.

It is further expected that the pressman capable of handling a machine of the class herein treated is conversant with the various technical terms used, as well as the correct name of each part of the press, or will so inform himself. And while it is the aim of the writer to make such suggestions in this work as will be of value to the younger pressmen, it should not be construed as an effort to establish any "short cut" to first-class pressmanship. As a matter of fact, the pressman must perfect himself in the art by practical working experience, and this manual is not intended for, nor can it be of value to, a would-be pressman who has not become reasonably familiar with presses and the general principles of their construction and operation by actual experience.

Hence the various operations are not treated with such a degree of detail as would seem necessary to make them understood by a mere novice.

Should there, however, be references which seem obscure to the reader, or technical terms used which are not fully understood, it would be advisable to seek other sources of information, lest a misapprehension at the very start nullify the desired good work.

CHAPTER III.

ADJUSTING BED MOVEMENT.

AS a preliminary it is advisable to strip the press of all its inking rollers and air plungers, and to disconnect the mechanisms which drive and also those which raise and lower the cylinder, and to take off the bed-bearers and the segment and register rack, so that the operation of the bed alone may be carefully observed. Much may often be determined by the "feel" of the driving-wheel, particularly to the observant pressman, hence the wisdom of trying each portion separately.

If the machine be a comparatively new one, no great degree of wear may be noticeable, but in any event particular attention should be given to the cleaning of every part, and the careful opening of every oil hole. Some grades of stock are particularly prolific in lint or paper dust, and this will work all through the press, necessitating careful cleaning. If badly "gummed up," some of the smaller working parts may need cleaning in lye or other similar solvent.

Naturally the points at which the greatest wear is to be found will be those concerned in the reversal of the bed at each end of its travel, and it will also usually be noticed that the parts engaged during the printing stroke will show more wear than on the return stroke.

Whether the bed movement be of the old "Napier"

type or its various modifications, or of the so-called "continuous" style in use on many machines, there will be found some sort of a crank-pin motion or similar device engaged in the reversal of the bed. In most instances the crank pin on the side of the bed driving-gear wheel (usually called the "star wheel") passes inside a heavy "shoe," this latter being in curved or straight form, and doing the double duty of keeping the star wheel up to the bed rack as it reverses and of limiting the travel of the bed. Hence this point is one where the greatest wear is to be found and by the same token is usually provided with means of close and accurate adjustment.

As a special precaution be sure that the bed rack is attached absolutely tight to the bed, for an almost unobservable looseness here has been known to spoil a press for fine register, to the entire mystification of an expert erector, who spent two days in vain search for the cause of the trouble, and then made the discovery quite by accident.

The only way to examine the adjustment of the bed movement with accuracy is to lie down under the press and have a helper turn the driving-wheel slowly. On machines of the "Napier" type, the shaft carrying the star wheel will swing vertically in the "slot hanger," and means will be found for limiting this vertical travel at top and bottom so as to keep the teeth of the star wheel properly in "mesh" with the bed rack. These teeth should engage full depth, but do not set them so hard as to "grind."

A small volume might be written concerning the adjustment of the "shoe," there being quite a diversity

of opinion among pressmen on this score. In general, however, it is enough to see that the thimble or roller on the crank pin on the side of the star wheel enters the shoe easily and is just tight enough to have a good rolling contact throughout its travel and until it leaves the opposite side. Probably experience only can teach just how closely fitted the shoe should be, and the younger pressman should make changes at this point with great caution, carefully studying the situation and doing nothing by guess.

It is also advisable to remember that while the designers and builders of the press were by no means infallible, they doubtless had some good reason for each detail of construction, and these reasons should be carefully studied. Indeed it is hard to conceive of any class of machinery more easily ruined by "a god of ignorance with a monkey-wrench" than modern printing-presses, so here as elsewhere it is well to "make haste slowly."

In presses having bed movements of the continuous crank type, about all that need be done is to see that there is no lost motion in the crank-pin bearing and that the gearing driving the master-crank is in proper mesh.

Having completed the adjustment of the bed movement, it will be found desirable to run that portion of the press slowly for a few minutes, while still disconnected from the rest of the mechanisms, examining the various parts carefully and listening for any sound which would indicate either undue friction or lost motion.

While the bed is held approximately to its position by those portions which engage with the rollers on the

tracks, there will also be found adjustable gibs, usually outside the tracks proper, which insure absolute accuracy of movement, preventing any sidewise motion of the bed, as well as precluding its lifting from its ways at any portion of its travel. The tightening of these gibs is a very delicate operation and must be done with great care, for because of previous wear the fit may be too tight in some portions of the travel while just right in others. Needless to say, undue friction must be avoided, as it might develop into "cutting" and great injury to the press, and at any rate the oiling of these gibways must be thorough and frequent.

On those presses which have supports under the impression line of the bed in addition to the tracks proper, and usually in the shape of a group of rollers on the top of a "stand" mounted on the center cross-girt, great care must be exercised in getting the height of these rollers just right. Sometimes they can only be adjusted after a form has been put on and the impressional power tested, but in any event their adjustment is a delicate matter, demanding the best judgment. The rollers should turn under the printing stroke, but care must be used not to get them too high.

On certain other machines, supporting rollers just under the bearers and revolving on studs set in the side frames must have close attention, having in mind that there will be less opportunity for spring at this point than on the cross-girt.

While this work is going on, an excellent opportunity is offered for cleaning and oiling the air plungers. The leathers should be treated with neat's-foot oil, and before putting the plungers back on their spindles test

each one in its own air chamber, expanding the plunger a bit if necessary to make a good fit (not too tight).

After putting on the plungers run the bed at medium speed for a few minutes, making certain that all parts move freely and without undue friction.

The proper degree of air compression (or "spring" as it is usually called) to secure an easy reversal of the bed, will call for the best judgment of the pressman. Always remember that the varying weights of the printing forms must be taken into consideration, as well as the differing speeds of the press. If the bed slows down perceptibly as the plungers enter the air chambers, it indicates too much "spring" or too tightly fitted plungers. The remedy is obvious. Too little "spring" will usually cause a noticeable "bump" or knock as the bed reverses, and is equally to be avoided.

The ideal condition is one in which the degree of "spring" is just sufficient to reverse the bed with the least wear on its driving parts, and the nearer you attain this the less wear and tear on the press. But avoid running with too little "spring" as well as with too much, and take pains to set each plunger as near like its mates as possible.

CHAPTER IV.

CYLINDER ADJUSTMENTS.

NOW carefully examine the cylinder bearings, taking off the caps of the main boxes and seeing that the journals are in good condition. In replacing the caps, it may be well to remove a thin sheet of packing if previously used between the two halves of the boxes, or if none be present, to dress off the flat face a thousandth of an inch or so. In any event the boxes should not bind the cylinder journals, when tightly bolted home, to such an extent as to prevent the cylinder being rotated by hand. If you get them tighter you invite trouble.

See that there is no opportunity for "end play" in the cylinder. Some presses are built with a removable thin collar just inside one of the boxes, and this may be slightly increased in thickness if necessary. Usually, however, the careful fitting done by the pressbuilder at this point will last the lifetime of the press.

On machines where the raising and lowering of the cylinder is accomplished by the use of eccentric boxes, these eccentrics must also be very carefully inspected, for it is just as necessary that they be accurately fitted as the main boxes themselves.

In all these operations a delicacy of adjustment is required even exceeding that of a well-built steam-engine, and if the pressman feels any doubt as to his own resources it might be desirable to call in a good

machinist rather than to take any chance of injuring his press. As a rule, however, if he will carefully study each move he makes, and having a well-considered reason therefor, he need have little fear as to the results.

The mechanism for raising and lowering the cylinder is usually in need of but little attention. Although the various types of construction necessitate widely varying devices, their principle of operation is much alike throughout. On those machines which employ heavy coiled springs to counterbalance the weight of the cylinder and prevent its "running down," the springs may need setting up a little tighter or, possibly, renewing. All parts of the impression "trip" should be carefully looked over, and the positiveness of its action assured.

The shaft actuating the cylinder-lifting mechanism, whether by cam action or the direct throw of crank-pins, should also have attention, particular attention being given its bearings to see that there is no considerable degree of lost motion in any part.

Having now assured ourselves that the two main moving portions of the press are ready for operation, we next proceed to adjust them so that they will operate together, and right here and on the care with which this is done is largely dependent the register of the press and the clearness of its printing.

Put the impression bearers back on the bed, first testing them carefully with calipers to detect possible low or worn spots. If the press has seen several years' service it will undoubtedly be best to have the bearers planed off lightly on the face anyhow.

Some styles of bed movement are known to show worn spots on the bearers sooner than others, but at any rate, be sure the face is level and smooth.

SETTING THE BEARERS.

As to the correct height of the bearers, the style of the bed-support must to a certain degree govern. On all presses it is advisable to set the bearers type-high (918-1000 of an inch), and on some machines which have no track directly under the bearer, a thin paper higher. To insure the accuracy of this operation, use a standard type-high gauge, such as may be procured from any supply house. Use very hard paper (bond or ledger) or strips of tin under the bearers, so that the height will not change later.

With the bearers correctly set and firmly screwed in position, we may now proceed to set the cylinder to its correct height, this being best done before the cylinder-driving mechanism is connected.

SETTING THE CYLINDER.

Run the bed to the center of the press and rotate the cylinder so that it will be brought down by its own mechanism with its bearers touching those of the bed at a point outside the printing surface of the cylinder. This is to obviate possible error in setting the cylinder at a point on its printing surface where its own bearers may be worn.

Having previously raised the cylinder a bit by its adjusting screws, it may be now brought down on to the bed-bearers, letting each end touch lightly at first, then giving each screw about an eighth of a turn more to be sure of good firm contact.

Some pressmen prefer to set the cylinder by the use of a large metal type, or a regular type-high gauge, and to then put the bearers on the bed as previously outlined. Either plan should be equally satisfactory in results if carefully carried out.

It has doubtless been the experience of many besides the writer that the average press erector does not set the cylinder on a new machine down hard enough, and that subsequent trouble with slurring and worn and blackened edges is mostly to be attributed to overpacking the cylinder in an effort to get the necessary "squeeze."

Of course it is possible to set the cylinder down too hard and thus cause undue wear on the bearings and an annoying "bump" when the bed and cylinder bearers meet. A good way to judge as to whether the two ends of the cylinder are set exactly alike (which of course they must be), is to run a strip of thin paper through on each bearer simultaneously and compare results. If the cylinder is set right both strips should show the squeezing effects alike.

The cylinder-driving mechanism may now be connected up, first making sure that it is in correct "time," i. e., that its printing line is at the proper point on the bed, this being often indicated by a line lightly scratched on the bed. With the cylinder "down" on the printing stroke, connect the gearing, usually by sliding the "intermediate" gear-wheel into place. The stud, or bracket carrying the stud, on which this intermediate gear revolves is adjustable in position, and great care must be taken in setting it so that the teeth of the intermediate engage just the right depth with

the cylinder-gear when the cylinder is down in printing position, and also with the driving pinion or small gear-wheel on the driving-shaft. The best test for this is running a small strip of thin paper through between each pair of gear wheels If the gears are set too deeply the paper will be cut and ground accordingly, while if just right the paper will come out practically uninjured.

CHAPTER V.

REGISTER RACK AND SEGMENT.

IF gearing never became worn, and all boxes and bearings remained as carefully fitted as when the press left the maker's shop, there would perhaps be little use for the short section of rack on the bed and its corresponding segment or section of gear on the cylinder. To be sure, there is always, even in a new machine, some degree of "back lash" in the gears, and a slight, although hardly to be noticed, torsion of the various driving shafts in the press.

So that when we add to these unavoidable structural defects the wear and resulting lost motion of years of use, it will be seen that some device to bring the bed and cylinder exactly together at the commencement of the printing stroke becomes very important in its adjustment, especially, too, because of the varying motions of the two parts.

The cylinder, although revolving continuously in its bearings in one direction, is subject to retarding influences through the action of the gripper motion and other causes, while the bed is subject to a multitude of frequently changing impulses. The speed of the press, the "set" of the air-springs, the weight of the form, the "pull" of the inking rollers — and all these varying greatly as different forms are put on or weather conditions change — have a great influence over the freedom of movement of the bed.

Hence the necessity for great care in adjusting the rack and segment, for not only is the printing register of the sheet dependent thereon, but the sharpness of the impression as well.

This was well demonstrated on a rather ancient drum-cylinder machine which once fell to the writer's care, the teeth of both rack and segment being so worn that cut overlays pasted carefully and exactly on the first impression taken on the cylinder would show on successive impressions during the run as being anywhere from exactly on the mark to a full pica away. Of course, a new rack and segment corrected this, and with some needed adjustment of the gripper-rod made this press register almost perfectly, although it was over a quarter-century old.

Many pressmen prefer to set the rack and segment after the form is made ready, and although it is an operation that may be effectively attended to beforehand, it is the writer's belief that considering everything it is just as well to defer the final adjustment until that time, particularly if the press be somewhat worn through use. Accordingly we will anticipate our regular procedure to the extent of assuming our form to be made ready and proceed in this manner.

As a preliminary, the principle of operation should be carefully studied. It will be seen that on the forward ends of the rack and segment, where they first engage, the teeth are not full size, but gradually increase to full size just before the printing line is reached. So that even quite a degree of lost motion in bed or cylinder or both may not bring the teeth with tops (or ends) together, as they first engage.

SETTING THE RACK.

First be sure that the segment bolts or screws are perfectly tight, for almost universally the adjustment is made on the rack alone, the bolt holes in the latter being generously slotted for this purpose.

Now loosen entirely the bolts holding the rack to the bed and tighten them lightly, the idea being that the rack may move a little either way and will thus find its own position automatically. Now turn the press around by hand, watching carefully when the bed and cylinder come together on the printing line. If no serious difference in position is noticeable, run the press at its normal speed (six or eight impressions) and then tighten the rack bolts.

As a test of the correctness of this adjustment, put a fresh draw-sheet on the cylinder and take a number of impressions thereon. If the rack and segment are correctly adjusted, no variation in the position of these impressions should be noticed, even at considerably varying speeds. If the position of the rack now seems correct, scratch a line on its face and continue this line up or down the bed as a definite point from which to work in case further adjustments be subsequently necessary.

Should the trial impressions on the cylinder disclose variation in position, further adjustment is at once necessary. The most common difficulty arises because the bed is not held back against its driving mechanism quite as snugly as it should be, and the usual plan is to move the segment ahead, say about one sixty-fourth of an inch at a time, taking repeated trial impressions

at each move so as to ascertain the exactly correct point.

Care must be taken that the rack be not moved ahead too far as it would lead to excessive wear, and in some instances to a slur or blackened edge, farther back on the printing surface. While if the rack be set too far back it pulls the bed ahead of its driving mechanism at the beginning of the printing stroke, only to lose it farther back with equally disappointing results.

Hence the pressman will see the necessity in this, as in other operations, of using his head and studying the reasons for changing adjustments and their results.

CONTINUOUS REGISTER RACKS.

On those presses which have a rack and segment engaged the full printing stroke, practically the same methods of adjustment are necessary. It will be seen, however, that there will be no opportunity for the bed to correct any false position at the start, and hence the increased necessity for care. Further, as will readily be seen, a press equipped with this continuous rack may become a formidable engine of destruction to plates or type form, if the diameter of the cylinder be increased beyond normal by overpacking. This point will be treated more explicitly later in considering the make-up of the tympan.

CHAPTER VI.

GRIPPERS.

HAVING assured ourselves that our two surfaces are traveling together, let us now look to the adjustment of the grippers and guides, either of which may be destructive to good register, and for often apparently trivial causes.

While there are a number of devices in use on modern presses to actuate the grippers, they are essentially alike in these particulars, that the grippers must be brought down and closed squarely on the sheet without shoving it back, must not move the sheet after closing on it, and must hold it so firmly that the friction of the sheet bands (or brush, where this is in use) can not drag it back in the least. So that these fundamentals must be had in mind when studying the operation and adjustment of the grippers.

Sometimes, through misuse or an ignorant attempt to rectify poor register at the wrong point, the grippers may be found sadly bent out of shape so that they strike the edge of the sheet before closing on it, thus knocking it a bit away from the guides. In other instances the ends of the grippers do not rest fairly on the cylinder, the pressure being farther in. In either event the correct shape should be restored, either by reshaping the old grippers or the substitution of new ones, making sure that all are even in length and of correct bearing on the cylinder.

Next look to the gripper-rod and see that it has no appreciable lost motion in its bearings, and if it be carried in brackets bolted to the cylinder, see that they are tightly fastened. A press recently under the writer's observation had been for years condemned for its poor register, when a good part of the fault was due to a loose bracket carrying the tumbler end of the gripper-rod.

Especial attention should be given to the spiral gripper-spring. Because of its relatively short length and the great tension it must work under to be effective, this spring is usually short-lived, frequently breaking into short lengths and thus losing its power. A safe plan is to always have a spare spring handy, as they break at the most unexpected times. On machines having a spring at each end of the rod, be sure that their tension is equal.

The type of gripper most in use to-day is the "tumbler and pin," so we will look particularly to the adjustment of this style of mechanism, having in mind that other forms of construction have to attain the same general results and treating them accordingly.

As a preliminary, after being sure of the spring, put on enough tympan sheets the full width between the bearers to bring the printing surface level with the bearers. Now loosen the set-screws of all the grippers on the rod and move the press until the tumbler is about to engage with the pin which turns it over, so as to take the sheet. Under the tumbler will be found a lug or rest, usually called the "stop." Between the stop and the tumbler insert a sheet of ordinary tympan manila, equivalent to about 24 by 36 — 70. Then,

beginning at the center of the rod, tighten the grippers, working each way. Hold the gripper firmly in position with one hand while tightening the set-screw with the other. When all are tightened test each one independently to see that they bear evenly and alike. This is best done by trying strips of paper of like width under each gripper separately, it being necessary that the paper should break rather than to be pulled from under the gripper.

Now turn the press ahead slowly, seeing that the tumbler and pin engage rightly both on the opening and closing positions. If all parts are correctly adjusted the pin should enter and leave the tumbler easily and without undue force or violence. Sometimes, however, the stops limiting the degree of movement of the tumbler require building up or filing off to hold the tumbler in the correct position to properly engage with the pin, but as a rule, with very rare exceptions, this is carefully tested out by the builder of the press and never needs changing.

It is well to run the press slowly a few revolutions after resetting the grippers, and when sure that their adjustment is correct, once more try them one by one to be sure that none has worked loose. Such precautionary steps as this and a few others to be mentioned later should become almost second nature to the careful pressman, thereby obviating the causes of disastrous accidents.

On machines having the "noiseless" type of gripper mechanism, the actuation is effected by a cam which engages with a crank arm, this taking the place of the tumbler on the gripper-rod. This in no wise affects

the setting of the grippers, but it renders all the more important a strong, reliable spring. For with a weak spring the roller on the crank arm may not always follow the cam closely, particularly if the speed of the press should vary, and thus cause a variation in register.

CHAPTER VII.

SIDE AND END GUIDES.

AS a two-revolution press must of necessity take the sheet from the feed-board "on the run," so to speak, the guides holding the sheet must be very closely adjusted. Their shape must be carefully looked after and their relation to their rests, or "guide tongues," as they are often called, must have careful attention.

It will be found that on all modern machines the builder has recognized that delicate screw adjustments on these guides are necessary to enable the pressman to preserve good register, although, of course, the principles of adjustment are the same in every case.

It is obvious that, considering the various styles of guides in use on the different makes of presses, only general directions can be of value to the pressman. First, be sure that the form is so placed on the bed that the printed sheet will have the correct margin on its gripper edge without materially changing the normal gripper hold or "grab," as it is often called. Too great a "grab" means that the side guides must be lowered so that the sheet is farther into the throat of the gripper, and in many instances this would be fatal to close register, a sheet having a tendency to curl up at the edge being struck by the curved body of the gripper before it had closed down tight on the cylinder edge.

Too little "grab" is equally to be avoided, for it

necessitates extra-tight grippers, and often interferes with the proper working of the delivery apparatus.

The position of the guide tongues with reference to the cylinder must have careful attention, for the closer they lie to the cylinder without dragging on the draw-sheet the better.

On modern, front delivery, two-revolution machines the tongues may have to be a bit higher than on the old-style back-delivery or drum-cylinders, so as to allow the delivery of the printed sheet in front of the cylinder without its being marked. On one of the best-known presses on the market, a slight second lift of the cylinder brings it close up to the guide tongues after the printed sheet has passed under them and out on to the delivery and just before the grippers close on the next sheet, a style of construction which is eminently satisfactory to the pressman.

Of course, the position of the guide tongues with reference to the ends of the sheet must be well considered, as also their nearness to the grippers. The pressman who has graduated from the feeders' ranks will know instinctively the best position of the guides with regard to good feeding and register.

As a general rule each side guide should be about one-sixth the length of the sheet in from each end, but, of course, this is subject to such variation as the character of the stock, the proportions of the sheet and the shape of the form may make necessary.

Being assured that the foregoing points have had due attention, the timing of the "lift" of the guides is next of importance. A very good procedure is as follows: With a sheet in position to the guides, turn

the press slowly ahead until the grippers are within one-fourth of an inch of closed. Now loosen the guides on the guide-rod and set the lifting lever of the guide-rod so that the cam which actuates it is in contact. Now tighten the guides and turn the press a bit farther. The guides should raise to the height of about one-eighth of an inch as the grippers commence to pull the sheet from the board. Of course, any indication that the sheet strikes the guides as it is taken by the grippers calls for a little quicker raising of the guides, and in the case of wavy or uneven edges this may be necessary anyhow. Always set the guides so there will be no marking of the edge of the sheet.

After the sheet has passed through see that the guides do not return to the tongues with such weight as to bend down or depress the tongues, having recourse to the "stop" on the guide-rod provided by the pressbuilder for that purpose.

When the position and movement of the guides seem to be correct test the register by running several sheets through the press, and then repeat the operation until each has had from three to ten printings. With careful feeding, correct adjustment of rack and cam and properly operating guides, no variation in register should be apparent.

As a further precaution, particularly when printing enameled paper, many presses are provided with "drop fingers," as they are usually called. These reach up onto the sheet a foot or so, and by dropping lightly on the sheet just before the guides raise, hold it without movement until the grippers have closed. Care should be taken that these fingers do not rest too

heavily on the sheet, nor raise so late as to hold back the sheet.

END GUIDE.

Ordinarily, the end guide is in need of but little attention, but if its face has become much worn by the "sawing" action of the paper against it, grind down the face and the bottom so that they will be square and even. Also be sure that in its fastenings there is no lost motion, but absolute, unyielding tightness.

Incidentally, it will be wise to see that the front or hinged section of the feed-board has no "play," either endwise or sidewise, for it is obvious that unless this be perfectly rigid, a variation in register may easily occur. On one press which the writer had under his care, a very "mysterious" case of bad register was finally located as the result of an indolent feeder leaning hard against the feed-board some of the time, a slight looseness in the hinges carrying this front section allowing it to move, thus carrying the end guide a thirty-second of an inch or more out of position.

The position of the end guide with reference to the gripper edge of the sheet must also be carefully considered, especially on close register work.

SHEET-BANDS.

The careful setting of the sheet-bands in front of the cylinder is very essential, although too often neglected, it being perhaps assumed that once they are set, no further attention will be required. Take especial pains that none of the bands are located so as to be

touched by grippers or shoo-fly fingers, as considerable injury can be done to either in a short time by friction against the band.

The best time to set the bands is after the usual tympan has been laid. Stop the press after the grippers have taken the sheet and just as they are opposite the lower band rod. Now set each band so it will lightly touch the sheet, having in mind that too light a band may not only mark or streak the surface of the sheet, but also possibly draw it from under the gripper, while loose bands may allow a slight "bag" in the sheet, with resulting slur, wrinkle, or loss of register.

As the result of grippers being set a little light on one end of the sheet and one single band being too tight on the same end, a sheet has been known to be drawn or "swung" out of register nearly an eighth of an inch on that end. Troublesome wrinkles are often caused by wrongly adjusted sheet-bands, and on the other hand their skilful manipulation will often take out a wrinkle which may have its origin in the poor condition of the paper or improper make-ready of the form.

Be especially careful that the bands at the end of the sheet do not come at the very edge of the paper, as in this position they are pretty sure to cause trouble. If the grippers be set so that one is on each end of the sheet, a band just inside each gripper is in the correct position.

Another point — don't adjust the sheet-bands while the press is running. You may think that you are too agile to be caught, but the inking rollers are very close

and running very fast, and more than one pressman has found to his sorrow that very painful injuries may result from a moment's thoughtlessness. No one wishes you to risk the loss of fingers or even an arm by taking such chances, and all the time you could save by not stopping the press for these adjustments, might be lost many times over in digging you out and taking you to the hospital.

BRUSH ADJUSTMENT.

On those presses which are provided with a "brush" to smooth out the sheet, and hold it up close to the cylinder, equal pains must be taken that the brush is not set too tightly, nor in a position to curl or otherwise injure the edge of the sheet. This brush will be found of especial value in close register work, and the intelligent pressman will be quick to perceive and appreciate its advantages.

It can not be properly set without taking out the form rollers, and there should be on the cylinder a tympan equal in thickness to that used in regular printing.

Run the press with a sheet in the grippers until they have nearly reached the printing line. Now open the grippers and pull the sheet back from them so it will be held by the friction of the brush alone.

Then set the brush carefully up to the cylinder, being sure that each end bears alike.

The ideal condition for the brush is that in which the center bears just a little heavier against the cylinder than the ends, and to attain this it may be necessary to "shim" between the brush and the bar carrying it, at

about the center. A few strips of paper, as may be necessary, can be readily and permanently attached with shellac varnish. With the brush correctly set, it operates to drive out the air between the sheet and the cylinder, and to do this it must exercise a distinct wiping motion, easily noticed when pulling the sheet back as mentioned above.

SHOO-FLIES AND STRIPPERS.

On those presses where the delivery construction uses shoo-fly fingers to give the forward edge of the sheet a lift as it passes out onto the delivery, the proper setting of these fingers or shoo-flies, as they are usually called, is of prime importance.

Some makes of presses allow of the entire removal of the rod carrying the shoo-flies during make-ready, while on other presses the shoo-flies can be tipped up out of the way while laying tympan, etc., and themselves return automatically to correct position when the press is moved ahead.

In setting the shoo-flies, see that they have the full upward movement allowed by the cam, and that they lift the sheet at the correct time. Do not set the fingers too close to the grippers, for a wrinkling or marking of the sheet is sure to result. Also be especially careful not to set a shoo-fly directly under a guide tongue, for in backing up the press the shoo-fly might be caught by the end of the tongue, to the great damage of both.

It is also well that the shoo-fly does not come directly against a sheet band, for this might cut or mark the sheet, and also wear away the shoo-fly itself.

Certain makes of front-delivery presses have stripper fingers which strip or loosen the printed sheet from the cylinder after the shoo-flies have given it a preliminary lift, while others dispense with the shoo-fly entirely, the stripper fingers being so operated as to start under and lift the forward edge of the sheet.

The pressman must use the best of judgment in setting these strippers, for more than one luckless or incautious wight has seen his carefully built overlay stripped from the cylinder and torn into ribbons by too closely set stripper fingers. And as even serious injury to the press itself might also result, the need for great care will be readily appreciated.

BACK DELIVERY.

On most of the older styles of two-revolutions, and on drum-cylinder machines, the sheet is taken from the printing cylinder by the back delivery reel, and turned over, so that it slides face down onto the fly. On some classes of work this led to baneful markings and disfigurements of the printed sheet, hence the invention of the " front delivery " in its various styles.

But as there are still many of these older machines in use, the pressman handling them must do his best to overcome the difficulties incident to this style of delivery, and he will need nimble wits to meet the varying conditions.

Of course the grippers on the delivery reel must first be looked after to see that they open and close at the proper time and manner to hold the sheet firmly before the cylinder grippers drop it. Also see that they do not open against nor too close to the cylinder

grippers, nor against the ends of the fly-fingers. On certain presses an adjustment is provided whereby the tips of the delivery grippers may be varied in their position as regards the edge of the printing cylinder, and of course the pressman must use care lest his tympans be torn off by trying to set the delivery grippers too close.

The difficulties incident to the marking of the sheet by the fly can be overcome in various ways. Sometimes there will be vacant white margins in which fingers may be set, with possible strings or wires from fly-finger to fly-finger to assist in carrying the sheet.

Another plan often resorted to is to attach thin brass or tin star-shaped wheels to the sides of the fly-fingers, or set them in slots sawed in the center of the fingers. These can be about one inch in diameter, and if they revolve freely on their centers, the sharp points will mark very little, even on cut forms.

On smaller machines, strips of coarse sandpaper glued to the faces of the fly-fingers, and renewed as necessary, will be found very effective. As this rough face may prove annoying when handling thin stock, it will be found a great convenience to have an entirely complete extra fly, with its fingers covered with sandpaper, to be substituted for the regular fly with its smooth sticks, when necessary.

The arrangement or spacing of the fly-fingers on either front or rear delivery presses must be determined largely by the size and thickness of the sheet to be handled, and on presses running at any considerable speed some experimentation may be necessary.

On most front-delivery machines no special adjust-

ments are required for varying sheets beyond arranging the wings on the delivery board or jogger, and setting the cam to start the delivery movement at the correct moment.

Most presses built to-day have front deliveries for handling the sheet either side up, and readily changed from one to the other, according to the grade of stock being handled, etc. It will easily be noted that on cheap, coarse work, where the sheet is to be backed on its own or another form, the fly, delivering face down, will obviate the labor of turning all the sheets over. But on fine work, the right-side-up delivery not only facilitates quick and easy inspection, but deposits the sheet more gently on the board, thus having less tendency toward offset.

CHAPTER VIII.

SETTING THE ROLLERS.

WITH all the moving parts of the press properly adjusted, we are now in readiness to "ink up," preparatory to putting on a form, and here, as elsewhere, the preliminary work is important.

It is to be presumed that we have available a set of good rollers in proper condition, not too recently cast, nor too old and hard for use. Later in this work the care of rollers will have the attention the subject deserves.

First be certain that the ink-plate sets level and type-high from the bed line, if the distribution be of this style. Many instances have shown that through accident or otherwise the face of the ink-plate may be sprung or in some other manner be out of correct position and of course the proper ink distribution would be greatly affected thereby.

Also see that all metal distributors are round and straight. This latter point is of vital importance, for these heavy rollers are often sprung by a fall or other careless handling. Have them taken to a machine shop if necessary, tested in lathe centers and trued up as may be needed.

Much has been written and said about the proper "set" of inking rollers, but after all it may be summed up in this general conclusion — set all rollers so they

will touch gently the surfaces with which they are in contact.

Doubtless any pressman can easily set his "dress" of rollers on this plan, provided the sockets or journals are not worn too seriously; and did rollers never shrink nor show the effects of the weather, few roller troubles would develop. But as shrinkage is an inherent quality of roller composition, the pressman must watch his rollers, resetting them from time to time as necessary.

So too, must the rollers have watchful care when the hot, humid days of early summer come on, for the relatively soft "winter" composition is very sensitive to such conditions, as many a pressman has learned by bitter experience.

Many presses of more recent design use one size and length of roller throughout the machine, and here the good judgment of the pressman must dictate which roller is by its condition best adapted to a certain position in the press. The opinions of even expert pressmen vary widely as to what constitutes a good form roller for high-class work, and doubtless the climatic conditions, the grade and "body" of ink used, the speed of operation and other factors, must to some extent determine this point. Here, as elsewhere, the observant pressman will become more and more valuable as his experience broadens and his powers of observation are quickened.

The form rollers should first be set for height with a type-high gage or a large metal letter, so that they bear gently on its surface, and then set up to the metal distributor, just sufficiently tight to touch throughout

their length. Be particularly careful that one end is not set tighter than the other, or in other words, that the form roller is not out of line with the distributor.

Angle rollers, "riders" and duct rollers must all have similar adjustment, the duct or fountain feed roller needing especial care on account of its relatively greater movement.

Having the rollers all properly set, it is an excellent plan before putting on a form which will take considerable time to make ready to remove about half the rollers, inking up lightly the remaining ones. This affords additional rolling capacity after the make-ready is completed, and lessens the work of washing up in the interim. And the less washing a roller has, the better.

CHAPTER IX.

PUTTING FORM TO PRESS.

IT might be inferred from the previous rather exhaustive directions for making various adjustments, that the actual work of putting a form to press must be fraught with enormously trying responsibilities, but as a matter of fact, the press so adjusted and "tuned up" will be found all the easier to handle subsequently, during make-ready and while running.

Then, too, it need not be thought that all these adjustments must be looked after every time a form is changed, for as a matter of fact only a radical change in the class of work or size of sheet being handled will call for any material change in the setting of the rollers, grippers, guides or delivery.

PREPARATION OF FORM.

Nominally, of course, the pressman is expected to take the form that is given him to print, put it to press, make it ready, and produce printed sheets of as nearly perfect character as possible, and this without having had any opportunity to suggest or plan means by which his work might be lightened or made more effective, or the results improved.

He is given combinations of type, rule, slugs, electrotypes, half-tones and miscellaneous printing blocks often little better than junk. And perchance these may have been compressed within the rigidity of the

chase by a so-called stoneman who thought he was locking up the form and whose chiefest ambition was to "make her lift."

The shortcomings of compositor, electrotyper, engraver or of all in common must be rectified by the pressman. His skill must neutralize the results of slighted or incompetent work from all who have gone before him, or else so cover up the defects that they may not be noticeable.

Thrice blessed, therefore, that establishment where manager or superintendent has seen to it that the pressman need not be so penalized, but instead is asked to give of his best judgment in the preliminary operations. For in this way not only are superior results assured but a real economy in operation is attained, to say nothing of the infinitely better feeling between departments which is certain to result.

While it is perhaps not strictly within the scope of this work, the writer wishes to deprecate the too-often found feeling of hostility between composing-room and pressroom. Mutually expressed feelings of contempt or ill will between these departments or their employees, from foreman down to apprentices, will nullify the best efforts toward that desirable unity of action and feeling which our French cousins so aptly term *esprit de corps*, and which is the basis of all effective coöperation, in shop or out of it.

Probably, in many instances, men in each department have, as charged in the unwritten indictment, "butted in" to matters which properly were under the control of other departments, hence the pressman must be particularly careful that he give no reason for

complaint as being officious or dictatorial in his suggestions.

At any rate it must be evident that a great deal of preliminary work can be done at the stone to facilitate make-ready on the press, and on most of these details there can be no two opinions. Bringing blocks to type-high, and trimming their sides so they will be at absolute right angles with their faces, is of the greatest importance. Establishments having no electrotype foundry in connection will find that the installation of suitable machinery for this purpose is an investment sure to pay handsomely.

If the stoneman be an adept in such things, he can also be furnished with a few other tools more often used by the electrotype finisher, and so occasionally reblock a badly out-of-shape plate that otherwise would give lots of trouble on the press; the services of a regular foundry, however, being always preferred where available.

In addition to securing level and true printing blocks in the form, its proper justification will also be of great help to the pressman. Too often shortcomings in this respect are overcome by excessively tight locking, a sure foe to good presswork.

Certainly the pressman must be consulted as to the proper position of the form in the chase as regards margins, etc., and occasionally there will be a distinct choice as to which edge shall be to the grippers. This must often be determined by the imposition with reference to machine folding later, and occasionally the presence in the form of a particularly heavy cut will suggest putting that edge of the form toward the ink

plate. For the observant pressman will quickly notice that even with the entire inking apparatus of his press in operation, there is sure to be on forms carrying many cuts a little stronger "color" on the side next to the ink plate.

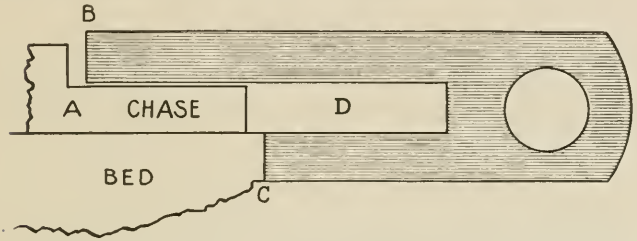
PLACING THE FORM.

Before putting the form on the press, be sure that the bed is clean, a good plan being to wipe it carefully after the preceding form is taken off and then oil its entire surface with a rag saturated with machine oil. If the form going on has any type lines in it, examine these carefully to be certain that no spaces or quads may have dropped down and perchance gotten under the type.

Slide the form carefully onto the bed, keeping the rear edge elevated so that possibly loose type which may be protruding a little below the bottom of the form may not be broken off, until the entire form is on the bed. If the chase be smaller than the bed, secure it in position by the use of suitable furniture. Old blocks from which electrotypes have been taken are useful for this purpose, and a supply of varying sizes in pairs will be found to save time and give a more secure lock-on than the use of much narrow furniture.

In determining the space between the edge of the form and the gripper line, a good procedure is to lay a sheet of the stock to be used on the form in the correct position, and then move the form until it has the correct gripper hold. Although many presses have the gripper line scratched on the bed, this is not always visible when putting on full forms, hence the pressman

will find it advisable to use a gage in determining the position of his form. The construction and use of this gage is readily seen from sketch herewith, and it is a wonder that so simple and useful a tool is not always supplied by the pressmakers with each machine.



A indicates form, B indicates gripper line, C the edge of the bed. Space D allows for the occasional chase which will overhang the edge of the bed.

After locking the form on, most pressmen slightly loosen all the quoins and go over the entire form with planer and mallet. Occasionally forms which have been locked on perfectly level stones, or iron slabs, will need no slacking of quoins, and if such forms have carefully adjusted rule miters, etc., it will be well not to disturb them if possible.

CHAPTER X.

MAKE-READY.

WHILE many of the foregoing operations are practically a part of the process, we have now come to the work that is usually known by the term making ready.

And here it is that the pressman will quickly demonstrate whether he is worthy of the name or not. For so varied are the conditions confronting him that a volume of even encyclopedic proportions would be inadequate in giving directions for his guidance at all times. Of one thing, however, he may be certain, that unless he uses good judgment and devotes himself intelligently to the work in hand, a woeful waste of his time as well as that of an expensive machine will result. Further, the type or plate form entrusted to his care may represent a previous outlay of several hundred dollars, and the whole may be reduced to junk value through wrong treatment.

Apart from such specialties as posterwork, label printing and the like, presswork may be considered of two classes — printing from type (including Linotype slugs) and printing from plates. And although there is in principle very little difference, the procedure must be varied to suit the character of the work in hand.

Nowadays, much of the work being handled in a general printing establishment will give the pressman a combination form, oftentimes type, slugs, electro-

types and original half-tones all in one form. So possibly by letting such a form become the object of our attention we can in a general way cover the manipulation of any single form made up wholly of any one element.

TYMPANS.

Doubtless many pressmen go wrong right at the outset of make-ready through failure to adapt their tympan to the work in hand, and this perhaps partly through failure to understand the theory of the printing process.

To illustrate this point, take your lead-pencil and sharpen it to a medium point and wear this point down until it is level. Now press this point down on a sheet of paper laid on a smooth, hard surface, and you make an impression just the size of the point. Remove the paper to some softer substance and the same degree of pressure will give you a materially larger dot, because not only the end of the lead but also a little of its sides come in contact with the paper.

This will illustrate the theory of hard packing and demonstrate why it yields so much sharper and cleaner results than the felt, rubber or composition packing of a generation or two ago. Not that these tympans were illy adapted to the work in hand, for, as a matter of fact, they were not. The rougher papers (usually requiring dampening to be printable) and the relatively coarser illustrations of the earlier days made the felt or rubber blanket a very necessary component of a tympan, and even to-day, for poster printing and the like, they are unexcelled.

But with the introduction and perfection of highly surfaced book papers and a corresponding increase in the use of fine wood and process engravings, came the desire for a hard, smooth tympan on which the fine lines and dots of the engraving would print their faces only.

Hence the now commonly used hard packing, usually a sheet or sheets of hard, smooth board, known as "bonnet board" or pressboard, the best formerly obtainable only by importation, but now made in this country. Where this is not readily obtainable, smoothly finished manila tag board is sometimes used.

For a number of years pressbuilders calculated the printing face of their cylinders so that the softer tympans could be used if needed, and to get a hard tympan on one of these older presses, two and sometimes three sheets of pressboard are needed. Latterly the depth of the printing face has been decreased, until on some recent productions an allowance for a thin sheet of packing and five sheets of paper only has been made. And some pressmen are securing excellent results by substituting a sheet of polished zinc for the pressboard.

On the supposition that our press is of the ordinary type, we can doubtless carry about eight sheets of paper over the hard packing, and we will proceed accordingly.

HARD PACKING.

A great deal depends on so attaching the sheet or sheets of pressboard to the cylinder that they may not work loose, and particularly that they may lie down tight to the cylinder without a "bag" or "buckle." There are many different ways of accomplishing these

ends, and each veteran pressman will have his own pet methods, which, if effective, are as good as others. A very good procedure is as follows:.

In laying a new sheet of pressboard, first be sure that it is cut the right size and square. It should almost fill the space between the bearers from side to side, should extend clear to the back edge of the printing surface of the cylinder, and project over the forward edge about two inches.

Now take a narrow strip of cardboard, hook it over one of the hooks under the forward edge of the cylinder, and drawing it back snugly, mark the edges of the cylinder. Using this as a guide, score the pressboard lightly but with a true straight-edge, so it will bend squarely over the front edge of cylinder, and also give it another light score so it will readily bend back over the hooks.

The position of the hooks may be carefully marked by laying the pressboard up on the cylinder, or a strip of paper can be pressed on to the hooks and used as a template. Punch the holes (an ordinary belt punch will do very well) a little larger than the hooks, and carefully fit the pressboard onto the hooks and then draw it down on the cylinder. If your calculations have been carefully made it should fit the cylinder as does the skin to an orange. If another sheet of pressboard be needed, proceed in the same manner as at first.

The next step is to draw over the pressboard a sheet of muslin or paper, which shall hold it in place and prevent the back edge from sagging away from the cylinder during make-ready. Only very fine and evenly woven muslin must be used for this purpose, and if not

obtainable in this quality a sheet of tympan manila is to be preferred.

In using the muslin, glue into a " hem " or double fold along its forward edge, a strip off your pressboard or some similar material about an inch wide, and when dry, punch holes for the hooks in the same way as for the board itself. Hook the sheet on firmly and draw it down tight, winding the back edge on the reel provided for that purpose, nearest the printing surface. Be careful that your sheet reels on true and even, so that it draws down fair and tight all over.

Next lay on two or three sheets of medium weight calendered book paper, and over this reel down another sheet of manila, using the second reel for this purpose. If you are preparing for a long run and cut overlays, it is an excellent plan to paste the edges of these sheets under the tympan clamps so they may not become loosened during the run.

Some pressmen dampen this manila sheet before reeling it down, so that the subsequent shrinkage may draw it even tighter than the ordinary reeling will, but there are on the market several grades of tympan manila in varying widths of rolls, which are so strong and smooth, that carefully put on they will lie perfectly tight and unyielding.

TRIAL IMPRESSIONS.

You are now in readiness to take trial impressions of your form, which, to begin with, should be very light ones, lest an overly high block might be ruined by a killing " squeeze " at the very outset. Put a sheet or two of the stock you are to run down to the guides

and take an impression. If it be clear enough to define your margins, etc., see now that you have the correct amount of gripper-hold, and that your form is otherwise correctly placed on the bed as to sheet-slitter, etc.

Proceed to take additional impressions with more and more sheets added until you have a fairly good print of the entire form, and if the form backs itself, "turn" a sheet in good register. This sheet may now be sent to the stoneman or foreman for a preliminary looking over, and if satisfactory should come back to the pressman with the endorsement "O. K. for make-ready." While it is being looked over, the pressman need not be idle, however.

He can determine what his plan of make-ready is to be, and in many instances do considerable of the actual work. None of this, however, should be of a character that would prevent or interfere with a subsequent unlocking of the form or a change in its margins, such alterations being frequently necessary for a variety of causes.

CHAPTER XI.

UNDERLAYING.

EVEN with all the care that can be exercised by engravers and electrotypers, their blocks will not always reach the pressman level or type-high, and despite all pains taken before the form comes to the pressroom, some underlaying will be necessary.

And probably no branch of the art has ever seen greater sins committed than those due to an ignorant attempt to do the impossible by underlaying.

In the first place, to be most effective, the underlay should be placed between the plate and the block, and not under the block. Here is where it will do the most good and the least harm. For it is an easy matter to so underlay below the block as to make it "rock" in the form, a condition sure to develop troubles galore later.

So important is this point that it would be well for every pressman to have the necessary tools and conveniences for lifting plates from their blocks. An excellent outfit for this purpose comprises a screw-clamp mounted on an iron base, for holding the blocks, also a thin chisel for lifting the plate, pliers, blocking hammer, brads, etc.

Of course care must be exercised in taking off plates that are tightly nailed on, and the increasing use of screws by electrotypers is to be commended accordingly. And in many instances the block must be under-

laid below anyhow, to bring the general level up to type-high.

In placing underlays below the blocks remember that the results aimed for can only be general in effect, for it is foolish to expect a hardwood block, practically three-fourths of an inch thick, to have such elasticity as to transmit to the printing surface of its plate the finer details which can only be brought out in the overlay.

The writer has seen many an overzealous pressman using tissue paper on a carefully marked out underlay when better effects were easier and quicker attained by a thickness or two of fifty-pound paper.

Avoid a spongy underlay of many thicknesses of thin paper. Bring your blocks up to type-high so that they will be properly rolled, and when the form as a whole pulls a fairly even impression, you are ready for your overlays.

In underlaying between plate and block, a far greater degree of sensitiveness will be observed, and the use of fairly thin papers will be advisable, particularly in handling original half-tones or electrotypes therefrom.

PATENT BLOCKS.

The procedure in underlaying plates mounted on patent blocks is of course simpler, in that the plate is readily removed and replaced at any time. It will doubtless be noted by the pressman that the old-style wooden blocks, even of the best manufacture, and with brass-bound edges, will not yield so level an impression as the more modern all-metal bases. Because of the

defects inherent in all wood blocks, more or less unevenness is certain to develop.

In handling a series of forms on the same blocks, it may be found advisable to attach to the blocks (on their upper surfaces) what might be termed a "standing underlay" which shall, in a general way, compensate for these imperfections in the blocks, and in addition underlay each plate as its own condition may indicate.

There are many pressrooms, particularly those handling book editions of the less particular class, which do practically all the make-ready under the plates, and this too in such feverish haste that the plates bear mute witness to their ill-use. Such conditions do not require pressmen, but rather machine operators, the resulting product being of a grade that should properly be designated by some other word than "printing."

The more modern iron beds and the various metal bases built up of adaptable sections are so much to be preferred to any wooden base for almost every grade of printing, that it becomes a wonder that their use did not become almost universal long ago.

In underlaying plates on these unyielding bases, however, the pressman will find that more care is necessary than where the slight yield or compressibility of the wood was a factor. Thinner paper may be used and it must be placed with greater exactness.

One of the points which the pressman must have in mind is the direction in which the cylinder travels over the plate. No matter how well adjusted the machine, nor how carefully made ready the form, the

tendency to wear will be on those edges which are parallel with the cylinder shaft. Old machines will quickest show this, and in underlaying plates it is well to leave these edges a little low for this very reason. Even on an old press, however, if properly made ready, and with the cylinder not overpacked, no form should show the blackened edges or "guttering" which invariably accompany such wrong handling of the press.

Underlays for plain bookwork without engravings may often be "marked out" on the back of the sheet and patched up with French folio or thin calendered book paper, the procedure being similar to overlaying. To do this and subsequent similar work, the pressman should have access to a mark-out board, situated in such a light that the unevenness of the impression will show very plainly on the back of the sheet.

Patching up, as it is usually called, can be easily done by the feeder or pressman's assistant on a near-by table, and to expedite the work as much as possible, the sheet is usually divided into quarters or even handled by the single page.

Underlays for engravings can usually best be made by cutting out those portions needing heavier impression from one or more proofs of the cut itself, and pasting these on to another sheet from which the portions requiring a lighter impression are cut away. Some pressmen use a piece of carbon paper under the sheet marked out, which allows marking up by the appearance of the face without reference to the degree of impression which may or may not show on the back.

In any event, and in spite of the haste with which this part of the work is usually done, see that the under-

lay is placed in correct position and pasted well to the plate.

If the form now pulls a sheet with a reasonably level and clear impression, the final stages of make-ready may be entered on, provided there has been given a definite O. K.

CHAPTER XII.

OVERLAYING.

WHILE the purpose of all overlaying is to produce exactly the correct degree of impression on every portion of the form, so that each individual letter, line and dot may impart to the paper its exact contour, methods in use to-day are widely varying.

It is safe to say that until hard packing was introduced the necessity for careful overlaying was unknown, and by the same token, the harder the packing and the closer we print to the bare iron, the more carefully must the work be done.

Theoretically, of course, we are handling a machine built of "unyielding" materials — steel and iron — and it is difficult for one unacquainted with the actual details of presswork to understand why so much time must be given to overlaying, when apparently all that is necessary is to bring a perfectly level bed and a perfectly round cylinder into even contact.

As we all know, however, the steel and the iron do yield, and though it be measured only in thousandths of an inch, it is these same thousandths that the overlay compensates for.

Then too, we must bear in mind that in printing engravings, certain portions must be impressed lightly on the paper while others must have a very heavy pressure, in order that the tonal values of the picture may be preserved.

Naturally the finer grades of work require the most careful overlaying, while it is not uncommon for an average form of type and cuts to require from five to ten hours' make-ready.

As the time of a modern two-revolution press is worth about $2 an hour, various plans have been devised for shortening or entirely doing away with the process of make-ready, with its apparently needless waste of valuable time.

Most of these attempts have contemplated an elastic blanket or packing, which should automatically give just the right pressure on every portion of the form, the latest development having a fine, spiral wire spring closely interwoven and imbedded in a rubber or composition blanket. While quite new, this is said to give excellent results, but under continued use is reported to lose its "life" and consequent usefulness.

For plain typework, nothing has yet developed that is better or easier to produce than the marked-out overlay. But as modern engraving methods have made the half-tone available for practically every class of printing, we find the great majority of forms to carry a generous proportion of illustrations.

In the old days of wood engravings, a pressman who could produce a good cut overlay was an artist. With his three (sometimes four) sheets of paper he faithfully built up his middle-tones and deep shadows, and with more or less difficulty transcribed the engraver's meaning. But with the introduction of the half-tone and its innumerable degrees of color value between deepest shadow and highest light, the cut overlay became, at best, but a lame attempt to achieve

results which could only be attained by some sort of replica of the half-tone itself.

To be sure, many half-tones are being printed fairly well with combination cut and marked-out overlays, but any pressman who tries faithfully to cut an overlay for a good-sized half-tone with wide variation in shadings will quickly realize the futility as well as the magnitude of his task.

PATENT OVERLAYS.

It is therefore not to be wondered at that various inventors have sought processes by which overlays might be produced which would obviate the shortcomings of the old-style overlays, and at the same time do away with much of the time-consuming labor necessary.

Several such processes are in successful use to-day, and it is perhaps unnecessary to add that not only do they save a vast amount of time and labor, but produce results which it would be impossible to equal by hand-cut overlays.

One of the best-known of the patent overlays is an actual low bas-relief of the half-tone, in reverse of course, but made from a mold of the half-tone, and being of gutta-percha or similar composition, is practically indestructible.

Another style is made by dusting various powders (as flour of emery, wheat flour, starch, and the like) on a strongly inked proof of the half-tone, and then fixing the varying thicknesses which remain on the heavy or lightly inked portions with a varnish. A variation of this process also employs heat to fix the powder.

Still later has been introduced the etched overlay, which from its ease of production and extreme durability, bids fair to become extremely popular.

In making this style overlay, a print of the half-tone is taken on a thin sheet of prepared zinc, which after slight preliminary manipulation is etched in nitric acid. The zinc is eaten away, to a greater or less extent, depending on the density of the ink on the surface, leaving the full thickness of the zinc on the deepest shadows and thence graduated down to the thinness of almost tissue paper on the high lights.

This overlay is easy to prepare, is readily attached to the tympan, and has no limit to its durability, so in spite of the expense attendant on a shop license (for the process is covered by letters-patent), it has become a favorite one in establishments handling half-tone work in quantities.

A very ingenious plan of overlaying recently in vogue employs a very quick-drying liquid, which may be painted on the various portions needing added impression, and while this method has not the exactness of outline of others, it is useful where speed is the chiefest requisite.

Still another style of overlay is really but a modification of the old hand-cut overlay, only in this method there is no building up, but all the work is done by cutting away. An impression is taken on a suitable quality of cardboard, and the various layers or " plys " of the board are cut and peeled away, to meet the necessities of the case.

It will readily be seen that overlays by any of these or similar processes may be readily prepared in ad-

vance, so that when the form goes to press there will be no delay in waiting for overlays. This is another illustration of the saving in time which may be effected by coöperation between departments, it being a great convenience to the pressman to be furnished the half-tone blocks in advance, so that he may take sufficient time to make his overlays carefully. Indeed a small hand press for taking the necessary proofs for this purpose will be found a most decided acquisition to the efficiency of the pressroom equipment.

But let us now return to the make-ready of the form in hand, with the presumption that we have the necessary overlays for the illustrations in readiness, and that the underlaying has been completed.

If our manila stretch sheet has become more or less disfigured during the preliminary work, it will be well to lay a fresh one, on which to take the necessary impression for attaching the overlays. In any event be sure that the impression you work by shows the actual position of the form, and was not taken previous to a possible shifting of some portions, as is sometimes done.

This impression should be sharp enough so that the position of the overlays may be clearly defined, and should allow four to six sheets being pulled on top of it to secure the working impression.

At the beginning of the work of overlaying, the pressman can work with thin book paper, say 28 by 42, 40-pound, as this will be at the bottom of his tympan; but the second and third overlays should be made largely of French folio and tissue.

Now pull a sheet with enough sheets under it to

give you a fairly strong impression, and cut it into single pages or rather small sections. Tear away the highest spots, outer edges of vignettes, etc., having in mind the direction in which the cylinder travels over the form and favoring these edges a bit. Preserve as far as possible a good margin by which this sheet may be attached to the tympan a page or section at a time, and attach to this sheet your cut overlays, being especially careful to match them in their exact positions. By this means, pages or sections of the form carrying several illustrations may be attached to the tympan far easier than to attempt to set singly all the cut overlays on the cylinder.

Many pressmen prefer to put on one marked-out overlay before setting their cut overlays, but it will readily be seen that in most instances the cut overlays are best put on at once, so that pages on which the impression will be lightened through being in line with heavy illustrations may have their impression correctly built up by the marked-out overlay, after the cut overlay has exercised its influence in this way.

After attaching this overlay, which for convenience we will call the first, to the manila sheet, loosen the reel and draw over this sheet another manila, reeling in the top sheet only. The wisdom of having the first sheet well pasted in position on the front edge will be readily apparent, and further, some pressmen prefer not to disturb the reel at all, but simply paste a temporary top sheet into position.

Right here is an argument for an additional tympan reel on all presses designed for handling high-grade work, this third reel making it possible to put on or

change the top sheet during long runs without even loosening the second reel carrying the manila to which the overlays are attached.

To be sure, the pressbuilder may not easily find room for three reels back of the printing surface, but a trial machine recently built to conform to this idea was found much more convenient to handle.

After the first overlay is set and the top sheet reeled down, take another trial impression and see particularly that the cut overlays are exactly in their correct positions, moving them slightly, if necessary. Nothing looks so slovenly as an otherwise well-printed sheet showing a cut overlay out of position. Better print the cut without any overlay at all than to run it in that way.

CHAPTER XIII.

MARKING OUT.

WITH all cut overlays in correct position you are now ready to make the second overlay, and here delicate work must begin. Take your sheet to the mark-out board and carefully tear away the highest spots, if necessary rubbing away the edges with your moistened finger to a long, thin bevel. The selection of the right paper for this purpose is readily made, but on no account use enameled stock, or a sheet in any way soft or spongy, for any part of your tympan.

With a crayon or blue pencil mark out the low portions to be patched up, having frequent reference to the face of the sheet as an aid in determining the best position for the patches. Thin papers only should be needed from now on, provided the underlaying has been correctly done, a good quality of French folio, onion-skin and tissue being used.

In marking out this overlay, have a care as to the edges of vignetted half-tones, for these must be handled with great delicacy, and the impression kept very light.

Have in mind that it is always easier to build up the impression a little on the edges than to reduce it after they have begun to blacken.

Separating the sheet into sections as before, the feeder or assistant can be going on with the patching while the pressman is marking out succeeding portions.

The assistant, however, must be particularly careful that the paste used is spread exceedingly thin, and that no lumps of paste or wrinkled patching-up paper appear. Too much pains in these respects can not be taken. Now lift the top sheet, attach this, the second overlay, reel down again and take another impression with only one or two extra sheets.

You are now ready to make the third, and usually the last overlay. Mark out the sheet as before, rubbing down the high spots, or tearing away edges with extreme care. It is often advisable to also go over the face of this sheet carefully, and " spot up " any apparently low spots. This may often be done without marking out, the pressman cutting a long, narrow strip of tissue and pasting on small portions as the impression may indicate is necessary.

After attaching this sheet to the tympan, a practically perfect impression should result, and except in rare instances, a fourth complete overlay should not be attempted lest the tympan become too soft and spongy. Rather, let any additional work be done by lifting the draw-sheet and patching on the cylinder direct, although the pressman must be governed by the conditions under which he is working, and the amount of time at his disposal. Sometimes, because of great haste to start the run, the final overlay is made while the press is running and put in position "between lifts."

For quite naturally the time spent in make-ready is, to all intents and purposes, idle and unproductive time, and it is only to be expected that managers and superintendents should strive to reduce make-ready time all that is possible. Here again is seen the wis-

dom of thorough work in the preliminaries, for now with overlaying completed we are ready to go ahead with the run.

Contrast this with a "no-system" shop, where, after overlays are all set, a change in imposition or margins is found necessary, or corrections are made in such a way as to move a cut a pica or two, and the wisdom and economy of well-considered, systematic movements are easily seen. Of course, even at best, such corrections or changes are sometimes unavoidable, but the consequent delay and loss of time indicate the wisdom of doing well the preliminary work.

CHAPTER XIV.

VIGNETTED HALF-TONES.

THE frequent inquiries from troubled pressmen as to the best method of handling vignetted half-tones easily indicate this as one of the real problems which vex the practical workman. And in considering the various methods in vogue we can readily appreciate the amount of study that many pressmen have given the subject.

For it is no easy matter to secure the beautifully soft effect which shows no defining edge, but gradually fades away into the pure white of the paper, particularly if the run be a long one and the vignette extends out into the margins and beyond the steadying influence of other pages.

Here, as nowhere else, is seen the necessity for such a carefully packed cylinder that the surfaces may move absolutely together, for the slightest tendency to "scour," or even a slight bagginess of the tympan, will kill the delicacy of the effect after a few thousand impressions.

Now that electrotypes of half-tones are being generally used, we must consider also the fact that they are of necessity considerably softer than the hard-rolled copper of the original plates, and by that token the fine dots of the vignette are all the easier blackened by wear.

While the writer has seen some very fine vignetted

half-tone prints produced from perfectly flat plates by the highest skill in overlaying, most pressmen find the problem easier solved by slightly lowering the outer edges of the vignette.

This is accomplished in two or three different ways, and it has the added advantage of less pressure from the inking rollers on the delicate edges.

The first and probably most generally practiced plan is merely a modification of the previously mentioned method of underlaying between plate and block. A quite heavy sheet of paper is cut about one-fourth of an inch smaller than the face of the vignette, and sometimes is supplemented by another still smaller. When this underlay is secured in place the edges of the plate are brought down tight to the block by screws or brads, thus leaving the main portions of the plate a little higher than the edge of the vignette.

Supplemented by careful overlaying this method is very successful, but it is well to note that the plate (especially if a relatively thin original) is quite easily "buckled" if the underlay be too thick, and further it will be seen that unless a wood base is used it is practically impossible to draw down or lower the edge. This is one place where the patent metal bases are to some degree inadequate.

Another quite generally adopted plan contemplates cutting away a little of the supporting metal under the extreme edge of the vignette, so that it may be bent and lowered, but it must be remembered that the dots of the half-tone are very small and delicate, and so can not stand any rough treatment.

One thing the pressman must be absolutely sure of

is, that the block itself lies perfectly level and square on the press bed, and that the plate itself is very tightly secured to the block. The writer has noted more than one instance where a vignette could not be made to work softly until a new block was put under the plate, and this in spite of the fact that no rocking motion of the old block could be detected.

Further, let it be the plan of the pressman to leave the impression all over the vignetted surface a paper light. It usually comes up strong enough after the run is well under way, or can be easily strengthened then.

A point sometimes overlooked in connection with this problem is the inking of the form, for if the rollers have the least tendency to "wipe" the ink onto the edges of the dots they will not print clean. Loose or badly worn roller gearing may produce this result, as will also worn roller sockets or journals.

It is also advisable to set the form rollers with the greatest care, and to see that they do not bear too heavily on the form.

Remember that the ordinary 150-line half-tone has 22,500 dots to the square inch, and is of necessity a delicate and easily harmed surface.

CHAPTER XV.

READY TO RUN.

WHEN the pressman has secured an impression which seems satisfactory, he can put in the rest of his inking rollers and fill the fountain, usually finding the added rollers to give increased brilliancy to the results of his make-ready.

A final O. K., however, must be had from the proper authority, and this must cover not only the points previously considered, but the quality and color of the ink used and the depth of color.

If the form be a portion of a book or a catalogue, reference should be had to other portions thereof before deciding just what is the best amount of "color" to carry, for succeeding forms may have lighter or heavier cuts which may demand a little different degree of "color" than the form in hand.

Nothing gives a worse general effect than to find different sections of a book or catalogue printed in a heavier or lighter color than normal, although this evidence of negligent pressmanship is often apparent, even between the two sides of a sheet.

After receiving final O. K., and particularly if the run is to be a long one, the pressman will do well to again look over his form and see that everything is in good condition. If the old-style iron patent quoins are used in its lock-up, these may be locked against

working loose by a short piece of flat brass dropped in so as to diagonally brace one quoin against the other.

The position of grippers, guides, shoo-flies, sheet bands, etc., should be noted and further adjustments made as necessary. Many pressmen also give their top sheet a good soaking with machine oil, thus making it to a great extent proof against moisture in the air, and further, less liable to generate electricity. This point will have further consideration later.

Another precaution, particularly valuable where the sheet is later to be cut up, or if additional colors are to be run on it, is to mark the guide end. This is oftenest done by driving a brad into some piece of furniture in the form and leaving its head type-high and at a point where it will just mark the edge of the sheet. A very good plan is to place this marker so it will also indicate the position of the end guide, thus assuring the position of this guide for succeeding impressions. Of course the marker must be removed when backing up the sheet. When all is in readiness, run a sheet out onto the delivery board and set the fountain.

SETTING THE FOUNTAIN

is by no means an exact science, for it is obvious that no one can judge absolutely as to the amount of ink that will be required. But by carefully comparing the printed sheet with the ink taken up by the duct roller, a fairly good start may be made.

If the fountain be generally too open, begin at the center and tighten the screws a little on each side successively, thus avoiding any tendency to buckle the blade.

Try to set the fountain so that a few notches less than the maximum rotation will be sufficient for the work in hand, for you thus have comfortable leeway for general regulation of the amount of color without movement of the thumb-screws.

If the form has wide spaces or margins between cuts or pages, cut off the supply of ink accordingly, for otherwise the surplus will be carried each way into the print.

Unless the ink be of such a nature that only a small amount is available (as expensive colors for instance), keep the fountain well filled, and stir the ink frequently.

COMMENCING THE RUN.

All being now in readiness, let the feeder put up a "lift" of the stock, and setting the counter to zero, go ahead, preferably at slow speed at the first, the pressman standing where he can observe each sheet and regulate the supply of ink. It will often be found necessary to lightly touch on a supply of ink additional to that given by the fountain until the regular distribution brings it to the form, but care must be taken that too great a quantity is not put on in one spot.

On very particular work it may be necessary to run some discarded sheets through while setting the color, trying the regular sheets one or two at a time until the desired evenness is attained.

As the fountain becomes correctly set, more attention may be given the other details requiring it, having particular watch-care that spaces, leads or furniture do not work up and blacken the sheet.

If the edition be a relatively short one, requiring

the sheet to be quickly backed, the amount of color carried may have to be lessened accordingly, or should there be a tendency to offset, because of electricity or otherwise, a lessening of the color may be necessary on this account.

When the color is decided to be just right, a sheet marked "O. K. for color" should be hung up near a good light so that frequent comparisons may be made and uniformity assured.

CHAPTER XVI.

DURING THE RUN.

THE foregoing suggestions are intended to aid the pressman in so making ready his form as to insure the minimum amount of trouble during the run, yet even at best it often happens that, despite the utmost care, annoying difficulties will arise and keep the pressman "on the jump" until the very last sheet is off.

Probably nothing will so thoroughly equip the pressman to successfully combat these annoyances as plenty of working experience, for conditions are so constantly changing that no two forms will be found just alike nor any two days' work dull because of similarity.

In their natural order the points to be attained by the pressman are:

Uniformity of product.

Maximum output per day.

Economy of stock, supplies and time.

The pressman who strives to excel in these particulars will not only advance in his employer's interests but his own as well.

Uniformity of product contemplates not only an even color throughout, but unremitting attention to see that no spaces, quads, leads or other "blanking-out" material "work up" and disfigure the sheet. No

mere cursory glance will insure this, but the sheet must be studied, page by page, and almost line by line. Of course in regular bookwork from plates, there is little danger from this, but there is the other danger that plates may become loose or gradually be driven out of position.

Gradual "filling up" or fouling of type or cuts is another foe to uniformity, and requires constant vigilance on the pressman's part. Almost all grades of stock have some amount of "paper dust" in the sheets, and in addition there is a constant tendency toward leaving a little "lint" on the form, this being enormously accentuated by the wrongful use of ink a little stiffer than the stock requires. When we consider that on an ordinary two-revolution press the bed and cylinder travel at the rate of about three hundred feet per minute, and that the printed sheet must be forcibly separated from the form at that rate of speed, the wonder is that inkmakers have so successfully solved the problem that there is relatively little trouble from this source, if the ink be intelligently selected. This point will be treated more at length in another chapter.

At any rate, frequent cleaning of the form will serve to preserve that sharp, clear effect characteristic of the first few hundred impressions. Because of the quickness with which it evaporates, gasoline is the handiest cleaning agent to be employed. Use a bristle brush, medium stiff, for cleaning type, and a soft cotton rag for wiping half-tones. Be exceedingly careful that neither brush nor rag contains any particle of grit, or such destructive devices as pins, buttons, hooks-

and-eyes, or the like. Thousands of dollars' damage to half-tones has been done by scratching their delicate surfaces through inattention to such simple matters as these, and it should become almost second nature for the pressman to watchfully guard his form from such injuries.

While the quantity of work produced from a certain press in a given time must largely depend on the speed of its operation, quite a noticeable factor is the willingness of the pressman to so economize its time that the stoppages are as infrequent and brief as possible. This must not be taken as permission to run "regardless," for nothing so quickly betrays the slip-shod, unworkmanlike pressman as his willingness to let the press run while he corrects some glaring defect, such as "streaky" color or the like.

Indeed, the one positive action to be taken when anything seriously wrong is discovered, is to stop the press. In this way the minimum number of imperfect impressions are produced, and every pressman of experience knows that it is the occasional poor sheet that is picked up by critical hands.

But, by watching and planning, the pressman can arrange to clean out cuts or otherwise work over the form while "lifts" are being put up by the feeder. He can also arrange for filling the fountain or cleaning the rollers at such times as will least interfere with the productiveness of the press.

The economical use of supplies is a point often overlooked by the pressman, with the result that one man will often use twice as much oil, tympan and overlay paper, wiping rags, etc., as another. While it

would be still more unwise to use too little oil, it is a great mistake to slop it on until the machine is smeared from end to end.

In the use of tympan paper, trial sheets, etc., let the pressman remember that all these cost money, and wastefulness therefore lessens by so much the profitableness of the pressroom.

And in handling the inks used, let the pressman bear in mind that cans kept in neat condition and well covered will have the minimum amount of "skin" and do the best work. There is also an appreciable saving to be effected by running just enough ink on a form during a long run, as against a too-full color, especially on heavy forms, and here the best of judgment must be used both in the selection of the grade to be used and the proper amount to carry.

Another point which should not escape due consideration is the ability of the pressman to handle two presses to advantage. Without doubt the majority of pressmen are expected to care for two and sometimes more machines all the time, and a certain degree of generalship is necessary to prevent delay in the operation of one machine while the other is receiving needed attention.

Of course, the character of the work being handled, and particularly the length of the run on each form, will largely determine the plans of the pressman. He will naturally strive to have but one make-ready in progress at a time, and by thus alternating them, keep the productiveness of both presses up to the required standard. Feeders and helpers who are really anxious to become more proficient, find in such occasions just

the opportunity for advancement, and are helpful accordingly.

A great deal may be done by the pressman, particularly if engaged in rather long runs, in the shape of what might be termed "advance make-ready."

The cuts to be used in following forms may be secured, proofs taken and the overlays prepared. Their blocks should also be carefully inspected to see that they are not warped or in other ways out of shape, particular attention being given to blocks that may have been on hand or in storage for a time, as these are often in an unprintable condition.

There are occasional waits between forms which may also be used to good advantage in looking the machine over carefully, seeing that nothing has worked loose or gotten out of adjustment, and possibly resetting the rollers. In this way the pressman may avoid possible serious delays or expensive "smashes" and acquire a deserved reputation as a careful and cautious workman.

While modern presses are characterized as a rule by simplicity of construction, the introduction of two-color, rotary and special machines for various purposes as well as numerous types of automatic feeders, will give the pressman ample opportunity for study, and he must not forget that as a rule promotions come to the man who is ready and not to the one who is fearful lest he do "more than he is paid for."

CHAPTER XVII.

QUICK MAKE-READY.

NOW that we have considered carefully the make-ready of a form carrying cuts, etc., let us also have in mind the simpler forms which require no such painstaking treatment, but must be put to press and run off in the shortest possible time. Indeed, not a few complete editions of books without illustrations are run off without any overlay whatever, or at best have a "standing" overlay designed to correct inaccurate blocks or a badly adjusted press.

Such forms as are made up of straight type or Linotype pages, should really require but little make-ready. As a rule the tympan may be made a little softer than for regular cut work, but the mistake should not be made of using too soft packing, else the impression will not be sharp and clear, and the face of the type will soon show wear.

What may be roughly described as "jobwork," such as ordinary circulars, report blanks, blank-book headings, etc., may also be handled on the tympan we have described.

Oftener than otherwise, the edges of pages will show up a little too heavy impression, although this is not so often seen where the press is kept in good condition, the bearers carefully leveled and the cylinder properly set.

The best method of quick make-ready of such a

form as this is to tear away the high edges or spots of pages where needed and use the sheet left as an overlay, attaching this directly to the tympan, with allowance for three or four sheets over it.

The power of quick observation will, with practice, enable the pressman to make ready a form of this class in a very few minutes. Indeed, the writer has seen many an edition of plain bookwork put through in this way with surprisingly good results, and with an average of less than an hour used for changing thirty-two plates (patent block), putting on a quick overlay and getting O. K.

In work of this class, as in other branches of presswork, the workman who trains himself to make no false motions, but to make every move count, will often outdistance his fellow workman who is always in a tremendous stew and apparently hurrying to his limit, but really is not accomplishing nearly what he might by better directed efforts.

Observation of the quiet, systematic hurry by which a "crew" of pressmen on one of the big metropolitan daily newspapers "dresses" a big rotary press and starts it whirling when a few seconds' delay would mean many dollars lost and prestige dimmed, will quickly demonstrate the necessity of making every move count.

CHAPTER XVIII.

COMPOSITION ROLLERS.

DOUBTLESS not a few of the older pressmen of the present day can remember, with the writer, how their apprenticeship days were enlivened by the spring and fall "roller casting." Usually a week was selected that promised a little slack time, and then the fun began.

Soaking the glue, stirring the composition, cleaning and winding twine on the stocks, cleaning up and greasing the molds, pouring the composition, and finally drawing the roller from the mold — all these were welcome if toilsome interruptions to the more humdrum duties of the pressroom.

And those were good rollers the "boss" used to turn out — once in awhile a bit spongy or showing an oil-crack in the surface — but, on the whole, good, serviceable rollers, admirably suited to the work.

Nowadays, however, it is rare that the pressman knows much about the rollers that he uses, except that he has read of mysterious "Gatling guns" and various other facilities by which the modern rollermaker is able to cast as many rollers in one hour as were put out in a week's time under old methods and conditions.

This is but another illustration of the fact that this is an age of specialization, and while we may, from purely sentimental reasons, regret the passing of the old-time pressman who could make his own rollers,

repair his machines, and at a pinch go into the composing-room and lay out and lock up his forms, it is certain that the increased effectiveness of the modern methods of work preclude any return to the older conditions.

Certain it is that the modern roller factory, with its large purchases of tested materials, its systematic handling of men and machinery, and the improved methods of mixing and melting composition and forcing it under pressure, into the great "gang" molds, there to be quickly chilled and set by the cold water turned into the jacketing, places in the pressman's hands a roller which averages closely to perfect. So that the care necessary to keep this roller in condition is about the only concern our latter-day pressman need feel.

Without good rollers the finest overlays are but vain efforts toward the unattainable. With them, all things are possible. And as the expense of a full "dress" of rollers for a modern two-revolution press is from $75 to $100 it will readily be seen that the prolongation of the useful life of a roller is well worth the pressman's time.

IMPROPER CARE OF ROLLERS.

Doubtless the greater part of the deterioration of rollers arises through wholly natural and unavoidable causes. Even a roller which is not used at all will eventually shrink and dry up and lose its "life."

Equally certain, however, is the fact that, through wrong handling or ignorance as to proper care, a great deal of needless harm is done most rollers.

A most common error, and this even in some of the best pressrooms, is the practice of washing up rollers before quitting time at noon and night. Rollers thus left exposed to the air for a very large part of the time will certainly show the ill effects of such treatment, and this is a practice so needless, that it is to be wondered that any argument against its continuation were found necessary. Possibly some pressmen may not have observed as carefully as others.

However individual opinions on these questions may vary, it is fairly well determined that after a roller has "seasoned" for a few days or weeks after casting, this seasoning process should cease. For it is really but a drying-out process and if prolonged will eventually leave the roller hard and without "tack" or life.

It is therefore an excellent plan to cover the surface of the roller with machine oil as soon as it is sufficiently seasoned and from thenceforward keep either ink or oil on the roller all the time.

BEST METHOD OF CLEANING ROLLERS.

It will be urged that because certain inks dry very quickly, rollers must be washed up, even over the noon hour, but if the plan of washing the rollers with machine oil be adopted this will not affect the situation.

Simply distribute a quantity of oil onto the rollers just before shutting down, leave it on until after noon or the next morning, as the case may be. The mixture of ink and oil is then easily wiped off the roller by waste or rags, and the roller is ready for business.

By this method the surface of the roller is kept

from the air, and the metal rollers and ink-plate are also very easily cleaned.

An oil very well adapted to this purpose as well as general lubrication is sold by the Standard Company under the name "Renown" all over the country at about 35 cents per gallon, and other companies sell similar grades at about the same rate. Only a little need be applied, and usually it can best be squirted onto the rollers while in motion, through the ordinary oil can, and quickly distributed to every portion of the inking surface.

Of course a little extra cleaning for colorwork may be done with gasoline or with very weak lye, but neither of these agents are of any help in preserving the face of the roller, although excellent for cleaning out a dirty form.

It is the almost universal practice to keep a spare set of rollers for each press. This enables the pressman to use during the winter months rollers which would be too soft for summer use, and vice versa.

Presses on which a considerable amount of work is done in delicate colors should have an extra set of rollers reserved for this class of work and never inked in black. It will be found that the purity of light colors will thereby be preserved when otherwise it will be almost impossible to secure or maintain the correct shade.

Usually the winter dress of rollers is cast during October, and by the middle of November is ready for use. These rollers, if carefully handled, will not only last through the winter, but will become hard enough for moderate summer use.

The regular summer rollers should be cast in April or May, and can be put in use about the first of June. Naturally, these rollers are cast harder than winter rollers, and usually will be found too hard for much service after the first of November.

The above is written as being applicable to such States as enjoy a climate about like that of Chicago, Detroit or Buffalo. Differing conditions will call for some alteration in this schedule.

When the rollers are received from the roller-maker, they should be immediately unboxed and examined carefully to see that they are perfect, having an eye for a possible "sprung" stock or injured face.

If without blemish, after a few days cover them (journals, face and all) with a good coating of machine oil, and put them away in the spare roller-closet, preferably a cool, dark, clean room. When you have occasion to put a roller out of service for awhile, treat it in the same way after a careful cleaning.

INCORRECT SETTING OF ROLLERS.

Easily next in destructiveness to excessive exposure of the surface of the roller to the air, comes wrong setting. As has been previously stated, there should be no difficulty in setting any roller just right, but unfortunately through ignorance or carelessness many rollers are ruined and the work done with them is impaired in quality, through wrong setting.

In setting the form rollers give particular attention to keeping them in line with the distributors, as well as touching lightly the form and ink-plate. Never change rollers from one position to another without

testing their "set," for otherwise many troubles may visit you.

See that angle rollers or distributors are set for just sufficient contact to insure their turning well, but not too lightly. Angle rollers must turn easily in their bearings, but should they run too lightly and "spin" out of position endwise, a heavier oil or axle-grease used on their bearings will obviate this.

New rollers are easily flattened by being left too long in contact with distributor or ink-plate, and the pressman will do well to release them from contact except when in actual running use.

On the latest style presses, the angle rollers are directly driven by geared distributors, but on older presses they are rotated wholly by the motion of the ink-plate. From being set a little low, as well as from other causes, the ends of these rollers are often roughened and torn by striking the edge of the ink-plate.

A device quite often in use on such presses consists of two flat pieces of wood extending a little beyond the ink plate, and so attached that their faces (which may to good advantage be leather-covered) will slide under the stocks of the rollers, just outside the composition, and thus commence the rotation of the roller before the composition actually touches the ink-plate.

Mechanical cutting of the face of form rollers is another fruitful source of trouble. Try to avoid this if possible — sometimes by planning to run exposed rules in the form the other way of the bed, or else by setting the rollers extra light and protecting the ends of such rules with cross-rules.

Finally, don't try to do good work without good rollers. When they have outlived their usefulness send them to the rollermaker. To his efforts the printer of to-day owes more than is usually realized or acknowledged.

Perhaps no one invention was so absolutely essential to the success of the cylinder press as the composition roller, and although the roller bill of a large press room is in itself a very considerable annual expense item, the cost per one thousand impressions is almost negligible.

Hence the folly and shortsightedness of any policy that contemplates the use of a roller that has lost its essential qualities.

CHAPTER XIX.

CLOSE REGISTER WORK.

IN preceding chapters explicit directions may be found for making and testing the adjustments of the press so that its register may be depended on. But the pressman will find that, even with his press registering perfectly, many other factors must be taken into consideration when striving for perfect register. It is a relatively easy matter to so adjust the press that successive impressions on the cylinder will show no variation whatever, but to turn out thousand after thousand of sheets showing two to five printings all in perfect register is quite another thing.

In the first place, the form for close register work should be prepared with more than usual care, having in mind that all wood will be more or less affected by the changing conditions of the air, and so using furniture and bases of metal as far as practicable. The stoneman of experience can do a great deal in making the work of the pressman easier by choosing such furniture for the form as will facilitate putting it into register on the press. When a particularly fine adjustment of blocked plates may be necessary, the introduction of a few leads and strips of thin bristol board on all sides of each page or section is often a great aid in shifting to secure register on the press.

Of course the all-metal base with its screw-adjusting clamps is for the most classes of register work the

nearest to perfection of anything yet devised, but the plates furnished the printer are not always susceptible of handling by this plan, and type or slugs must often be included in the form.

In any event, let the chase fit the form as closely as possible, and see that it is locked on the bed firmly and without "spring," the lock-up of the form being fairly but not excessively tight.

The preliminary operations and make-ready are substantially the same as for regular work, but there should be little work done on the make-ready until the register of the sheet is known to be correct, so that further unlocking of the form may be dispensed with. If the form in hand be the first or "key" impression, with others to follow, it becomes all the more important that nothing in the form may shift its position during the run, even very slightly, and the pressman will be all the more particular in setting guides, sheet-bands, etc., to insure the uniformly correct handling of the sheet. And as has been suggested, it is of prime importance that these conditions be tested every little while during the run by putting additional impressions on sheets which are known to be in register. In this way it is relatively easy, and far less expensive, to detect anything that may be going wrong, without waiting for the completion of the run.

STOCK FOR REGISTER WORK.

Probably few printers appreciate the fact that much of the paper received in their stockrooms is in no condition for close register work. Because of this, some of the more successful producers of three-color work

in the country have regular seasoning rooms where stock may be kept for a time before printing, but unless such stock storage affords an opportunity for thoroughly drying out the paper, trouble is pretty sure to result. Our trade cousins, the lithographers, pay especial attention to this feature, having usually an elaborate system of racks for the purpose. In any event it will be readily seen that if the sheet contracts or expands (and it will sometimes do both in very changeable weather) after the first impression is put on it, nothing but trouble will ensue. Hence, it will at all times be wise to select for close register work stock that is not fresh from the mill, but which has had a good degree of seasoning in the warehouse or stock-room. And it goes without saying that the stock should lie flat on the feed-board of the press without wavy edges. Further, the pressman will do well to keep it from the air as much as possible during the run, covering the piles with heavy wrappers, and even wrapping the sides of the piles in very damp weather, to prevent the access of the air.

FEEDING TO REGISTER.

Next to the proper adjustment of the press itself, good register is dependent on careful feeding. It is claimed for the automatic feeders on the market that they will feed to a more uniformly perfect register than can possibly be attained by hand-feeding. Considering the fact that the average pressfeeder is disinclined to exercise the extra care which close register work involves, the claims made for the machine feeders are well founded. Yet it is possible for hand-fed work to

be practically perfect and the degree of skill thereby evidenced is often surprising.

In the first place, the feeder must remember that it is essential that each sheet be placed to the three guides gently, for it is possible, particularly with a light-weight sheet, to crowd it against the guides and, by bending its edges, slightly vary the position.

An ideal procedure in feeding on close register work is to bring the sheet down to the side guides, and then move it gently along until it meets the end guide, taking especial care not to move the sheet farther in any way when disengaging the hand. The feeder must be particularly careful not to disturb the sheet after it is so placed until the grippers have taken it firmly and started toward the impression line. The utmost care in setting the guides, grippers, drop-fingers, sheet-bands and front brush, as outlined in a preceding chapter, will also be found essential to good register. A steady, even speed for the press, well within its capacity, as well as that of the feeder, is an absolute necessity.

CHAPTER XX.

COLORWORK.

WITH the increasing use of colors in decorative printing, as well as in regular two, three and four color half-tone work, the pressman finds that the demand on his skill is correspondingly greater. Where formerly the introduction of a few lines or border in color or tint was a sufficient cause for increased care and anxiety, there now comes the most skilful blending of colors, which require not only perfect register but a high degree of artistic color-sense. The pressman who would keep pace with the times must study these newer problems as they are presented, and thus be prepared to acquit himself with credit.

Fortunately, the inkmaker has done his part well, so that there is a great array of fine colored inks to choose from, and the pressman has to but make intelligent selection, according to the work in hand.

Of course, poster-printing and the like require more of quantity in the inks used than of quality, but the finer grades of color-printing demand inks that shall work well and in many instances take additional printings over the first one without spreading or glossing. Trichromatic half-tone printing requires inks which shall in practice yield the three primary colors, or as near them as practical results shall dictate.

Tint inks may be bought all ready for use from the inkmaker in all the standard gradations of color, or

may be mixed by the pressman as wanted. Several mediums for carrying the color are available, the ones most commonly used being regular white ink and magnesia, the latter, of course, ground in a suitable varnish. Various tint bases may also be had of the inkmaker, and in their use the shade and depth of color is controlled altogether by the addition of the coloring matter. Tint ink made by slightly coloring white ink is quite opaque, and should never be used when printing a tint over black or another color. It is, however, useful when putting a tint on strongly colored stock.

TRANSPARENT TINTS.

In printing a tint over black, as for instance in coloring the various sections of a map, magnesia or some similar transparent base should be used, so that the black will not be deadened, and in the choice of coloring matter for mixing such tints avoid as far as possible inks with a heavy mineral base. For instance, in mixing a pink tint use a lake red instead of a vermilion, a blue lake rather than ultramarine for a light blue, etc. In this way tints may be laid on in two impressions over black, as for instance a blue and yellow overlapping to make green, without perceptibly dimming the black. It will be noticed, however, that when a glossy effect is desired, the tint should be a heavy base, laid on strongly, and the other color or colors printed on top of it.

GLOSS TINTS.

Quite a striking effect in half-tone printing can be produced by using a tinted gloss varnish as a second

impression from the same block over a regular black impression. This has been variously styled "luxitint," "luxotype," etc., and for certain kinds of work and in connection with text printed in plain black it is quite effective. The gloss varnish used must be of fairly heavy body, the color thoroughly incorporated, and just the right quantity applied. Perfect register is absolutely essential, and the greatest care is necessary to prevent offset and sheets sticking together, this last being particularly troublesome during very hot weather.

TRICHROMATIC WORK.

Now that the process engravers have perfected their methods in making half-tones for printing in three or four colors, there is no longer the mystery attendant on this sort of colorwork that at first was a conspicuous asset of the earlier producers of trichromatic printing. Nevertheless, it still remains about the most difficult work produced in any pressroom, and hence not to be undertaken lightly. In the first place the choice of stock should be wisely made, for a great deal depends on having a coated paper with a perfectly white and smoothly finished surface. Some papers also seem to possess a chemical affinity for ink that is markedly absent in other sheets, hence careful experimenting and testing should precede the final choice of both paper and inks. These latter may be secured of several well-known inkmakers, much attention to their production along scientifically correct lines having been given in recent years.

All process engravers now furnish progressive proofs with their three-color blocks, so the pressman

has very definite results to work for. The yellow impression is of course the first one, and where the red and blue may be run on additional presses a more perfect blending of the colors may be secured without the annoyance of "glossing" by adding the second and third printings within an hour or two after the preceding impression has been put on. Often, however, this is not practicable, only one machine being available for the colors progressively. In handling three-color work, the pressman will find that the overlay plays a very important part in the general result. It will often be noticed in examining the engraver's proofs that certain features or details would look better if subdued a little in one color and strengthened in another, and it is well within the province of the pressman to do this.

It may readily be seen, however, that unwise "tinkering" could easily ruin the effect, and unless such varying of color-effect be done understandingly and with a proper appreciation of the spirit of the artist and engraver, a plain "flat" make-ready would be far preferable.

DUOGRAPH PRINTING.

A particularly effective result in two-color half-tone printing has more recently been employed, the two plates being produced by a differing "pitch" in the half-tone screen, and etched for the desired effect. Usually an under color of red, orange or varying shades of light brown, buff, etc., with final printing of black, gives the desired results, but wide variations are possible. It will be found best to do the second print-

ing very soon after the first, thus avoiding any tendency toward glossing the colors, and securing a softer and more pleasing blend. Perfect register is also an essential factor.

In general, let the pressman remember that to secure satisfactory results in color-printing he must know definitely what results he is striving for, and then work steadily and faithfully to that end. The absolute necessity for care and thoughtfulness is here most apparent, and only the workman who is willing to give the subject his best thought and attention will achieve even a fair measure of success.

CHAPTER XXI.

PAPERS AND INKS.

IF the pressman were expected to handle only one kind of paper and print on it in black alone, many of the perplexities that beset his path would be eliminated. Or had he to print on this one kind of paper in even many different colors, the problem would be relatively simple.

Modern papermakers, however, with all the wide world to ransack for raw materials, and by the aid of the ingenious machinery and processes that have been introduced in recent years, now present such a bewildering variety of papers as to fiber, surface-finish, color and absorptiveness, that it is no easy matter to choose intelligently the proper inks to be used thereon.

Indeed the possibilities of color combinations alone have been found to require an entire volume for their proper presentation, and another volume might be most interestingly devoted to paper and its manufacture. Hence the limitations of this chapter forbid our going into any detailed explanations.

In passing, however, it is only fair to inkmaker and paper manufacturer alike, to say that they have most earnestly coöperated with the printer and engraver, and by their efforts have made possible the beautifully printed pages which to-day are so common that we hardly regard them with interest, but which a scant

half century ago would have been deemed little short of marvelous.

The pressman is very rarely consulted when the choice of paper is made for any given publication, but he is expected to produce the right results just the same. Naturally, there are special limitations as to price, weight and availability which must first be considered, and with these the pressman has little to do. In a general way, however, he may often be consulted to advantage, particularly as to the results from the use of various brands of surface-coated papers, as there is a marked difference in their chemical affinity for ink.

CLASSES OF PAPER.

In general the papers handled in the ordinary course of work in a modern pressroom may be divided into three classes — book, writing and coated. These again may be subdivided roughly as follows: book-papers may comprise the varying grades of news-print, machine finish, supercalendered and special finishes, with wide variations in color and general quality.

Writings comprise not only the ordinary writing-papers, but linens, bonds and ledgers. In the press-room they are most frequently met in the printing of business stationery, report blanks, blank-books, etc.

Coated paper, or enamels, as they are quite frequently listed, are in a measure all nearly alike, although presenting wide differences in handling. The standard brands most commonly used are single-coated on each side alike, while other brands may be double-coated, and given an extra high polish. Some label papers are given a still higher polish by being mechan-

ically rubbed after coating, and usually these are coated on but one side of the sheet.

All these papers vary greatly as to surface and absorptive qualities, besides possessing widely differing chemical affinity for, or repulsion to, ordinary inks. Hence the pressman is often obliged to give considerable study to the particular quality of ink needed for a given sheet, even though but plain black be indicated. He will find that the character of the fiber in the stock he has to handle has much to do with its capacity to absorb ink, and by the same token must often be printed with rather soft inks, for heavy-bodied inks will pull away loose fibers, and in a short time foul up form, rollers, and even the ink in the fountain.

Writing-papers of the better class are made largely of rags, the very highest grade of ledger and bond papers requiring clean, white clippings from shirt and collar makers, and the finer grades of book-papers are also composed largely of rag stock. On these latter an ink of fairly firm body may be used, while the very hard, dense-fibered and full-sized ledger and bond papers require inks of particular density of body.

Enameled papers were a great trial to the pressman in the earlier years of their manufacture because of a tendency to "peel" or lift the surface coating. Paper-makers have now practically banished this trouble, although the pressman must always be on his guard lest the use of an ink of too strong a body on enameled stock start the coating in little spots, usually on the solids of an engraving, where most noticeable. Practically all colors may be worked on coated papers and usually with a marked increase of brilliancy, but as

there is a great difference in the chemical action of the coating on the inks as between various brands of coated papers, care must be taken to insure correct results.

COMPOSITION OF PRINTING-INK.

Primarily all inks are composed of the pigment (or coloring matter) and the varnish which serves as a vehicle or carrier, this being equally true of blacks or colors. The relation between these is a mechanical one, rather than chemical, but on the thorough incorporation of pigment and varnish a great deal is dependent. But chemistry also plays a very important part in ink manufacture, particularly as to the blending or association of different colors or varieties of pigments, and the choice of such varnishes or oils as will yield inks of good working and drying qualities. Likewise the chemist in the ink factory must be able to recognize the purity or lack thereof in the "dry colors" (as the pigments are known), few inkmakers being also dry-color manufacturers.

BLACK INKS.

Although the modern inkmaker has succeeded in giving us a wide range of beautiful colors in qualities that make their use possible on the very highest grade of work, blacks will unquestionably always be the standard for the greater portion of the work turned out of the pressroom, and the pressman is fortunately able to choose from a wide range in grade, so that his ink may always be adapted to the work in hand.

Lampblack, gas black, or carbon black in some of its various forms, combined with resin oil or boiled

linseed oil, and sundry other ingredients in lesser quantities, constitute black ink. The quality of these materials and the thoroughness with which they are mixed or ground together account for the difference in grade between the 6-cent news-ink and the $5 engravers' proof black. Indeed, it is rumored that crude petroleum has been used in a very low grade of news-ink recently, and the odor of some freshly printed sheets would lend "strength" to this report.

The higher grades of book-ink require lampblack of strong color and varnishes of the better grade. These must be put through the ink mills (which are powerful steel rollers running in close contact) several times, and naturally the proportion of pigment, varnish, dryer, etc., must be nicely calculated to insure the desired results.

POSTER-INKS.

Fortunately the cheaper classes of paper are usually employed for only those grades of printing requiring cheap inks of soft body and easily absorbed. The pressman will find a goodly variety of black and colored inks suited for use on white or colored print stocks. These are usually called poster-inks, and the name indicates their chief use, the blacks being oftener listed as news-inks. Poster-inks may be had from any good inkmaker, ranging in price from 6 to 10 cents per pound for blacks, up to 40 or 50 cents for permanent colors. As a rule, however, the ephemeral nature of the work done with them requires no great degree of permanence, their cheapness being the principal point and one readily appreciated because of the use of heavy-faced type and solid blocks.

COLORED INKS.

The researches of modern chemistry have brought forth a host of beautiful colors, so that almost any desired color effect has become possible. To be sure some of these colors, as for instance the aniline bases, are exceedingly fugitive, but on the other hand permanent colors in a great variety are available and not too expensive.

No fixed rules can be laid down for the guidance of the pressman in the use of colored inks. Conditions vary so greatly that no two pressrooms can handle them just alike. It is well to remember, however, that great care in cleaning rollers, ink-plate and fountain is a first essential. Delicate tints or light colors may require the reinking and recleaning of rollers several times before perfect purity of color is attained. Further, it may often be advisable to secure nickeltypes or nickel-plated electrotypes, so as to avoid the debasing action of certain inks (some reds and blues particularly) on the copper-faced electrotypes.

Where the work on hand is of sufficient importance and time allows, it is always advisable to give the ink-maker full particulars regarding the work to be done with his ink, submitting if possible samples of the paper, colors to be matched, etc. This will often obviate expensive delays while inks have to be mixed or otherwise altered.

HALF-TONE INKS.

With the introduction of the half-tone came the call for a different ink than that previously used on bookwork. The fine screen plates required an ink

" short " in body instead of " long " and " tacky," as had previously been used.

This problem was readily solved by the inkmaker, so that to-day the pressman has available from all the reputable ink houses, not only fine blacks, but a bewildering array of colors, most of which will print a half-tone perfectly, provided a paper of suitable surface be used. To be sure, few of the brighter colors are of any practical use in half-tone printing, but many deep and artistic shades bordering on black are now obtainable, and these yield most satisfactory results indeed.

TWO-TONED INKS.

Several manufacturers have within a few years placed on the market, under varying trade names, inks which yield prints showing two differing shades or tones of color. While the details of manufacture are supposedly trade secrets, it is understood that the " two-tone " effect is secured by grinding a pigment of one color in a varnish which has previously been colored or stained with a pigment of another color. Many beautiful effects are thus attainable, but the pressman must be on his guard in handling these inks. It has been found that most annoying offsets have occurred, even after the sheets seemed perfectly dry. Slip sheets should always be used and the printed sheets left in them as long as possible, even after they are seemingly dry.

It will be found that no two brands of coated paper yield exactly the same effect when printed with double-tone inks, so careful experimentation should precede any considerable amount of work with the inks.

SUITING INK TO PAPER.

Considering the general varieties of paper which he must handle, and the wide range of inks available, the pressman should not be greatly troubled in the choice of ink best adapted to the work in hand. The makers of good ink are no longer to be counted on the fingers of one hand, but their name is legion, and in the main their product is satisfactory to the user.

Too often, perhaps, the pressure of competition induces the use of inks on certain lines of work which were originally intended for cheaper grades, but even this may be done with a good degree of success, provided the rollers and press are in good condition and sufficient care be given the make-ready.

Where it is possible to do so, adherence to a few standard grades of blacks and colors will be found preferable to the indiscriminate sampling of many different lines. The pressman will thus come to know the qualities which make each grade most desirable, and can choose accordingly.

Nothing but experience will enable the pressman to judge of the quality of an ink, and even then, in making a decision, he should take into careful consideration any other conditions which might affect the results. Too often inks have been condemned and rejected when the real fault lay somewhere else.

For cheap papers use cheap, soft-bodied inks, and for hard-surfaced papers choose heavy-bodied, dense inks. Neglect of these fundamentals is sure to result in trouble.

Printing with a heavy-bodied ink on papers of soft

texture will quickly foul form, rollers and fountain, the fibers being detached from the surface of the stock at every impression. On the other hand, too light or soft bodied inks will not yield a firm impression on the harder papers, but will look smeary.

REDUCERS.

Unquestionably the better plan is to buy an ink that is just suited to the work, and the inkmaker can usually furnish it just right as to body if advised of the grade of paper, quality of work desired, etc.

When an ink be found too stiff for the work, the addition of a small quantity of boiled linseed oil will usually be found all that is necessary. Some pressmen also use turpentine, " hard oil " and japan — this latter to increase the drying qualities of the ink. Inkmakers furnish reducing varnishes for this purpose, and a variety of patented reducing compounds are on the market, some of which possess decided merit. Kerosene oil is sometimes used as a reducer for the cheapest grade of news-ink with success.

All these agents should be used sparingly, and an ink that seems to require any great degree of " doping " to become usable, had best be returned to the inkmaker.

A fault too often noticeable is the tendency of many pressmen to carry too heavy a color. Of course, the " solids " look best in a strong, full color, but this frequently results in filling and burying the middle tones of an engraving, as well as increasing the ever present danger from offset.

Here, as in everything else connected with his work, let the pressman use judgment and care, remembering

always that genius, as has been well stated, "is but an infinite capacity for taking pains."

COLD PRESSROOMS.

Particular attention may here well be called to the fact that unless the pressroom be kept constantly well warmed during cold weather, inks will not work well. If the several tons of metal in a press become thoroughly chilled, no mere warming of the surrounding air for an hour or two will bring the mass up to a suitable temperature. Cold ink tables, fountains and rollers will bring trouble to any pressman. Inks that were just right the night before, on a cold morning will seem altogether too stiff and heavy. The time wasted in trying to handle work on a cold press will several times over pay for keeping the room warm through the night.

CHAPTER XXII.

ELECTRICITY.

PERHAPS no single element has ever caused more trouble in the pressroom than electricity. Its manifestations are too familiar to the pressman to need recapitulation here, although the varieties of mischief which it is capable of vastly outnumber the celebrated fifty-seven.

And doubtless more than twice that number of remedies have been suggested and tried out by the sadly harassed pressmen of the country in the past few years.

While it is true that our greatest scientists are able to define electricity only as a certain form or manifestation of force, there is really nothing so very mysterious in its appearance in the pressroom.

Doubtless every one has noted that it practically disappears during warm weather, so without going deeply into the mysteries of the production of electricity in the pressroom, we easily infer that if we could maintain a constant summer in our stockrooms and pressrooms we would have very little trouble with this ordinarily vexatious force.

And as a matter of fact, this is really the case. If stock to be printed is kept for several days in a warm room, and further if the air of the pressroom be kept as warm and moist as it usually is in summer, very little annoyance will be noted.

This latter condition is usually rather difficult to attain, for most pressrooms are steam-heated and the air is consequently baked very dry. But here is also at hand a solution of the problem, for one or two of the supply pipes may be tapped, and at comparatively slight expense steam diffusers may be installed which will keep the air as moist as desired.

A form of this apparatus which the writer has seen successfully put in use in several pressrooms consists of a piece of ordinary one-inch pipe with a row of one-sixteenth inch holes about three inches apart its entire length. One end of this pipe is capped or plugged, the other end connected to the source of steam supply with an ordinary globe valve for regulation. To prevent the water condensation from causing mischief it is well to have a small semicircular hood over the steam holes, and a larger one below to carry away the water.

By the use of this air saturator the excessive dryness is very effectively overcome and this without affecting other conditions. It might be thought that saturating the air in this way would injure the register in colorwork, but as a matter of fact it is oftener just the other way. For usually the printed sheets are prone to shrink a little when exposed to the heated dry air of the pressroom, and unless the steam saturation is excessive no trouble need be feared on this score.

Many experimenters have found partial relief from the annoyance of electricity in the printed sheets, by various methods of wiring which allow the mischief-making current to escape into other mediums.

It has also been noted that passing the sheet over a row of gas jets (usually just in front of the cylinder)

after printing, greatly lessens the trouble. But this device is at best an element of danger, and the writer can not recommend its installation.

What is claimed to be an absolute neutralizer of electricity on the press, in the shape of quite an elaborate apparatus, is now on the market and well spoken of by those who have tried it. As it is a patented device, and quite expensive, its use can hardly be expected to extend very generally to the smaller pressrooms.

Various liquids are also offered the pressman, for use on his tympan, and unquestionably they are of considerable value under some conditions. Even the frequent use of ordinary machine oil or glycerin on the draw-sheet will be found of great help.

As a general summing up of conditions unfavorable to electrical troubles note the following:

Keep the stock warm for some time previous to printing. Keep the pressroom warm and its air reasonably moist.

Avoid excessive printing impression, let the "squeeze" be as light as will secure good results.

Keep the tympan well oiled or treated with neutralizing compounds.

Remove printed sheets from the press frequently.

Don't fume or swear.

CHAPTER XXIII.

PRESSROOM SYSTEM.

THE printing establishment which knows not the beneficial effect of system in its operation is like a ship without rudder, compass or sailing course. Fortunately, however, modern methods of accounting have invaded the printer's business office as elsewhere, and every branch of the business has felt the need of increased accuracy in handling work and in keeping records of its progress and completion.

The output of a modern pressroom will easily involve the expenditure of from five hundred to as many thousand dollars per day, counting in cost of stock, supplies, labor, etc., and unless all these details are handled in an orderly way confusion and loss will be sure to result.

Whatever may be the cost system in use in any particular establishment (and heaven help the printer who has none!), the pressroom records should show clearly and definitely the following data:

Name and description of form.
Press run on and name of pressman.
Date and hour form on and off.
Number of hours make-ready.
Number of hours running time.
Exact number of impressions.
Grade and quantity of ink used.

For the benefit, therefore, of those who may be

operating on a no-system plan, or wish to compare their system with others, a brief description of the system adopted in a typical pressroom of medium size follows:

Each press is known on the records by its number, and a list of the machines with size of bed, greatest possible printing surface, etc., is plainly posted near the imposing-stones in the composing-room.

Every job handled has its own order number, and every form going to the pressroom has its press ticket accompanying. On this press ticket is given all essential information regarding the form in hand — the size and quality of stock, color of ink to be used, the exact number of sheets to be printed and the disposal of the finished sheets. This ticket has also blank spaces which the pressman fills in as the work progresses, showing exact time form went on, time devoted to make-ready, running time, etc. Suitable blanks are left for explanation of any unusual delay, and for description and quantity of ink used.

In addition, a daily time report of each press is made out, whether the press be running or not, and time lost or idle hours are thus kept track of and the progress of each form easily traced.

These reports after being transcribed on the monthly report sheet are filed in order, and thus form a complete history of the pressroom as well as of the job itself.

It might be thought that these reports would involve considerable bookkeeping on the part of the pressman, but in actual practice it is found to be no burden whatever. And the knowledge that every hour

he is paid for must be accounted for on these reports, is in itself something of a stimulus to each pressman, there being the further opportunity for comparison of efficiency in all stages of the work, which quickly determines the relative value of each employee.

One result of such a system as this is that work may be planned sufficiently in advance so that each press may have allotted to it the size and class of form best adapted to its capacity, and waiting time practically eliminated.

If in addition to these general reports, each employee keeps a detailed time report, and this be checked against the general time-clock records, there would seem to be no reason why the proprietor or manager should be the least bit in the dark as to the cost of his output per day, or form, or thousand impressions.

Some pressmen very foolishly oppose keeping such records as these, but as a matter of fact, nothing else could more effectually safeguard the pressman from possibly expensive errors. It is always easier to "suppose" than to "know," but usually the man who knows is the one selected for advancement, and the old days of running a pressroom "by guess and by gosh" have gone, never to return.

CHAPTER XXIV.

THE PRESSMAN.

WITH all the care in selection and operation of presses that can be exercised, no factor is so important and so full of possible advantage or handicap as the personnel of the pressroom organization.

Fast-running machines and the latest labor-saving appliances avail nothing if inefficiently manned and handled, but an indifferently equipped pressroom can become a wonder as to quality and quantity of output, if the right sort of men are in charge.

And because it is the wish of every conscientious pressman to do his part in the preservation of conditions that make for the dignity, permanence and congeniality of his position, a few words toward this end may not be amiss in this work.

Apart from general ability perhaps no other one thing is so essential to the success of the pressman as a cheerful, willing disposition. By this is not meant a spirit of ill-timed levity or flippancy, but that true optimism which is the real basis of cheerfulness, and enables its possessor to look trouble in the eye and achieve success in spite of it.

While such a disposition as this is perhaps temperamental, yet there are few who can not acquire it to some degree.

Certainly the pressman who becomes known as a "grouch" will find few roses sprinkled in his path,

but on the contrary the difficulties inseparable from presswork will be multiplied.

The pressman who wishes to deserve the good opinion of his fellow-workmen, and so have the least possible friction in dealing with them, will remember that old-fashioned courtesy and a simple observance of the Golden Rule will work wonders. Too often churlishness is cultivated as being indicative of wisdom.

A wholesome respect for those in authority will characterize such a man, but this need not degenerate into that painful servility which too often indicates a loss of real self-respect.

Toward his equals he will conduct himself not too distantly nor yet with that degree of familiarity which breeds contempt.

In his attitude toward, and treatment of, his assistants or feeders, the pressman will quickly proclaim his true character. If he be a real man he will be tolerant and charitable, although not lacking in firmness, and will show a willingness to impart instruction, without which the rising generation would blunder along in darkness.

He will not be a bully nor try to impress his associates with the greatness of his personal attainments nor the profundity of his wisdom. These things will become known in good time, and without being shouted from the housetops.

In your relation to the "house" which employs you, remember that loyalty counts for a great deal, and not only in the way you handle the work but in your general attitude. If you will remember that the interests of the "house" are your interests, and that its

prosperity is reflected in your advancement, you will have solved the greatest of all "labor problems."

Not that greedy and unprincipled employers do not exist — shun them and "tie up" with the right sort; for without doubt the great majority of employers wish to give their men a "square deal" and expect to receive it in return.

One of the most important things the pressman (or any workman, in fact) should remember, is that he is selling his time, or a certain well-defined portion of it, to his employer, and failure to deliver the goods is a well-founded reason for dissatisfaction.

This is peculiarly true of the pressman, for not only is his direct wage a very considerable item, but he has in his care machines representing a heavy investment of capital, which can return an interest on that investment only by being operated. And further, other departments of the business may be dependent on the output of these machines in order to operate at all.

It should, therefore, be the aim of every pressman to give his work that direct, active thought which is necessary to its successful prosecution. Do not dawdle over your work, nor yet slight it in an attempt to acquire a reputation for speed. The old fable of the hare and the tortoise has in it a lesson for every one, and particularly for the pressman. There is no sensible employer who does not prefer the man of the somewhat slower but more certain movement, to his quicker motioned but less accurate and reliable fellow-workman.

And above all things else let the pressman be truthful, and square-toed in his honesty. Dark tales of days

gone by have at least made it seem probable that pressmen and those selling ink and other supplies often connived at practices which were not designed to benefit the employer's pocketbook. Grafting is no less an evil in the pressroom than in politics, and it smirches every one concerned in it.

Finally, let the pressman remember that the good old-fashioned virtues of sobriety, industry and patience are not out of place in the pressroom. Coupled with these let him be always a student, willing to learn, a reader of the publications devoted to his trade (and no other tradesman has such beautiful and helpful publications as the printer), a man whose opinion is respected because it is backed by good judgment, and he need never have an anxious thought as to the permanency of his present position or his ability to secure another.

CHAPTER XXV.

THE FEEDER.

NOTWITHSTANDING the very general and increasing use of feeding machines and the perfection of rotary presses, particularly in the larger pressrooms, it is certain that for many years hand-fed presses will greatly outnumber all others. And as the pressmen of the next decade will be largely recruited from the ranks of the feeders of this period, there seems ample reason for the inclusion in this work of a few observations which may be helpful to a class often rather looked down on or neglected.

For it is a regrettable fact that the necessity for mechanical feeders has become more and more marked because of inability to secure suitable boys or young men to train for this work. One of the strongest arguments advanced by its manufacturers is that the machine will not "soldier" nor quarrel with its mates, and barring accident will keep the press moving up to its full capacity.

Hence it behooves the feeder who is honestly trying to give satisfaction to his employer to have these points in mind, and to perchance avert or delay (in respect to his own press at least) replacement by a machine.

Apart from the general qualifications of honesty, truthfulness and industry, which we all recognize as

essential to success, there are various especially desirable attainments which the feeder should strive for.

The work of the feeder requires a fair degree of strength, a true eye and steady nerves. It is at best a trying vocation, hence the necessity for a more than usual degree of care of the body. Poor health is all too often the result of deliberate violation of known laws, and the feeder who thinks that even mild dissipation will not sooner or later affect his efficiency is certain to find out his error.

Going out "with the boys" or (some) girls, and staying late at night, will not give any one a clear brain nor steady eye the next day. Wholesome, decent recreation and amusement are always to be had for the seeking, and nowadays every city of any size affords evening schools, with instruction in a great variety of subjects. Far better put your spare time into study than the pursuit of questionable pleasures.

If the pressroom you are in has definite working rules, it is not merely good policy but good sense to observe them. Very few employees realize how much quiet watchfulness is constantly bringing to their employer the details of their efficiency or lack of it.

Promptness is a virtue that modern time-recording clocks have inculcated into many an unwilling laggard, but above all else, bring to your work a spirit of willingness and a determination to make every minute of the time count.

If it be a part of your duties to oil up the press, see that you do it neatly and thoroughly. It is not enough to aim the nozzle of the can at an oil-hole and give it a squirt. Much oil is wasted through "flooding," and

the general results are far from pleasing. Be particularly careful that the oil-holes are not stopped up. Carry with you while oiling up an old crochet hook, a piece of stiff wire or similar device with which to probe all doubtful holes and remove any accumulated gum. An oil-hole stopped up is proof of carelessness.

In oiling your press, have an orderly plan of procedure and in this way you will not be so likely to skip important points. An excellent plan to follow is to begin at the cylinder, then go to the rollers, the bed and the general driving mechanism; or, as preferred by some, to oil all of one side of the press first, then the other, and lastly all mechanisms between the frames.

In cleaning rollers, take especial pains that they are handled carefully and not dropped on the floor. In addition to cleaning the composition, see that the journals are wiped well before putting rollers back into the press, as dust from the floor has in it more or less grit. Further, be very sure that each roller goes back into the place it was taken from, for otherwise the adjustment will probably have to be done over again.

In helping the pressman during make-ready, the feeder will either learn the greater part of the pressman's trade, or else demonstrate that he will never make a pressman of himself. Too often feeders imagine that they are particularly clever in evading some of the work which is rightfully theirs, little realizing how they are thus standing in their own light.

If you are working with the right sort of a pressman you will be afforded ample opportunities to acquire the so-called " secrets " of the trade, and a little

quiet questioning occasionally will bring forth abundant fruit.

There is no reason why an observant and painstaking feeder can not pretty thoroughly master the science of make-ready by simply working with a pressman of a wide range of experience who knows his business.

In patching up a marked-out sheet, the feeder must follow the markings. Be careful in the use of paste, spreading it very thin and evenly. In putting an overlay on the cylinder, match it on carefully, and be certain it is on the correct section of the form.

During the run, remember that the productiveness and profitableness of the press are largely dependent on the steadiness with which it is kept in operation. Don't use the impression trip any more than is absolutely necessary — some employers think they would be money ahead if trips had never been invented.

If misfed sheets get into the finished product, your employer's severest critic is certain to see them, hence the necessity for careful feeding and the elimination of all wrongly printed or otherwise defective sheets.

A careful feeder will keep close watch of the press counter as he nears the end of his run, and not exceed the correct number of sheets to be printed.

In general, the feeder will see a thousand little things in which he may improve and increase his value to his employer, or he may see only the things he is "paid for" and so put himself on the list which is first consulted when a temporary lessening of work calls for the laying off of a few hands.

So to the feeder reading these lines, let this come

as a personal message: Do your best every day, feeling sure that your reward will come, not only in the increased self-respect which follows an honest task honestly done, but in the substantial advancement which will surely be yours.

CHAPTER XXVI.

A FEW DON'TS.

WHILE in the foregoing chapters the writer has endeavored to state as clearly as possible the things it is necessary to do in order to handle your press successfully, it may be well to notice also a few of the things it is well *not* to do, although there must be left unmentioned a host of things which the pressman will sooner or later have pounded into him in the school of experience. No amount of "book learning" can take the place of the working knowledge derived by years of practical handling and manipulation of presses. Mistakes will be made and errors in judgment displayed by the best of men, but the careful workman will profit by such mistakes and endeavor to see that he does not make the same mistake twice. Unavoidable difficulties will arise in spite of all that can be done to prevent, and occasionally a mistake will creep in that would seem easily to have been foreseen, but the pressman who thinks carefully what he is doing and the reason for doing it in a certain way, is less liable to mistakes than he who plunges ahead and "thinks afterward." Hence the following suggestions may not be valuable to the reader unless he belongs to that large class to whom a word of caution is often quite necessary.

In the first place, don't "suppose" nor take things for granted, either in the handling of your press or

your relations with your fellow workmen. *Know* that your press is in perfect condition, well oiled, the rollers correctly set, form well locked on so it will clear the grippers, and no small tools nor other articles left on the bed or form, before you take the first impression.

Don't waste any time in make-ready, unless of the most hasty sort, until you know that margins are correct and imposition has been verified.

Don't commence make-ready with rollers heavily inked; you will be working partly in the dark, and the results will be disappointing. Better have rollers inked too lightly at first.

Don't underlay type-forms (except in the case of individual large, low letters), nor put heavy, bunchy underlays below plates.

Don't try to accomplish by overlay alone what can often be easier, quicker and better done by the use of an underlay.

Don't take a trial impression on a full tympan — test it lightly at first; but when you are ready for the first "mark-out" take an impression heavy enough so that you can see exactly what you are doing.

Don't place cut overlays in position on cylinder unless you are reasonably certain that the form is secure against being unlocked or otherwise disturbed.

Don't under any circumstances overpack your cylinder so that its printing surface is greater in circumference than the bearers.

Don't think that you can do good presswork with a loose, baggy tympan. It takes no longer to lay your tympan right, and this is the foundation of your entire make-ready.

Don't use coated or enameled paper as a part of your tympan, nor in your overlay.

Don't try to hurry the make-ready by a hasty, ill-judged beginning. A little thought as to what you wish to accomplish and the best ways of going about it may save hours of valuable time later.

Don't fritter away your time in making tissue patches until the last overlay — use thicker papers and aim for general results at first, gradually refining your methods as you approach the completion of the work.

Don't unlock your form nor unclamp it from the bed without knowing positively that your press is secure from being started accidentally. If the machine be motor-driven see that the switch is thrown, or if belt-driven, see that the shifter is securely locked so it can not be accidentally moved. Never get into or under the press, nor allow another to work around it without taking these same precautions. Neglect of them has resulted in many a serious and expensive accident.

Don't fail to take a final look at the form after it has been unlocked on the bed for any purpose, to be certain that no tools, furniture or the like have been left thereon. An excellent habit is to rub your hand lightly over the face of the form, thus quickly detecting any protruding substance which might not be otherwise noticed.

Don't put anything back into the form after removing it for underlaying or other purposes without knowing exactly where it belongs, and which edge out.

Don't ask for an O. K. on your sheet until it is O. K. in your own judgment. Leaving a few spots

here and there to be fixed up later is an easy way to overlook them entirely.

Don't commence the run until you have a final and definite O. K. on all possibly doubtful points — the make-ready, the imposition, the color and the grade of stock to be used.

Don't try to cover up the imperfections of a poor make-ready by running too much ink; nasty offsetting will be the almost certain penalty.

Don't try to do good presswork with an ink that is not adapted to the work in hand. Don't run a hard, stiff ink on soft paper, nor a thin, light ink on hard paper. Decide at first what grade will be best adapted to the work in hand, and don't change during the run if you can avoid it.

Don't fail to carefully try the "set" of grippers, guides and sheet-bands if you are printing work that requires close register. Do this the very last thing before commencing the run.

Don't fail to give the sheet a careful and minute inspection very often during the run. A hasty glance is of little value save to reassure you that the general "color" is all right.

Don't run any more sheets on the form than your order ticket allows, but be sure that your counter has been held or set back to allow for all trial sheets or other superfluous impressions, so that its total may be relied on as rigidly correct.

Don't try to turn the sheet until you are sure the printing on the first side is really dry, and even then be very careful that nothing marks the first printing as it again goes through the press.

Don't let your press run a single impression after you have discovered a blemish in the printed sheet that ought to be remedied.

Don't imagine that there is any easy road to good pressmanship. Hard work and intelligent, well-applied effort will shorten the journey more than anything else.

Don't be afraid to earn all you are paid and a little more. The way to get a "raise" is to deserve it, and few employers can resist the logic of this argument.

Don't be "mouthy" or quarrelsome in your relations with your fellow workmen. The "scrapper" has no place in a modern pressroom.

Don't be a "grouch"; for your own sake and the sake of others around you, smile and see how the world smiles with you. That "molasses catches more flies than vinegar" is none the less true because of having been the doctrine of "Poor Richard" a century and a half ago.

And, finally, don't forget that you are a part of a great and busy world; that yours is an important station in it, and under any and all circumstances you must be faithful to your trust, to your employer and yourself, doing every day the tasks that it brings in the best way you know how.

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